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**DECLARATION FOR THE  
RECORD OF DECISION**

**SITE NAME AND LOCATION**

Powell Road Landfill  
Huber Heights, Ohio

**STATEMENT OF BASIS AND PURPOSE**

This decision document presents the selected remedial action for the Powell Road Landfill in Huber Heights, Ohio, which was chosen in accordance with the Comprehensive, Environmental, Response, Compensation and Liability Act (CERCLA), as amended by Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this Site.

The State of Ohio concurs with the selected remedial action.

**ASSESSMENT OF THE SITE**

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the remedial action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

**DESCRIPTION OF THE SELECTED REMEDIAL ACTION**

The remedial action will be a final site-wide remedy. The selected remedial action addresses the sources of the contamination by containment of the landfill and contaminated soils and treatment of leachate and ground water. The major components of the selected remedial action for the Powell Road Landfill are:

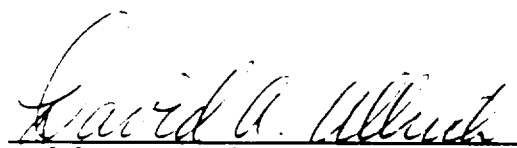
- institutional controls
- improved landfill cap with liner
- excavation of contaminated soils
- consolidation of soils under landfill cap
- ground water monitoring
- flood protection
- storm water controls
- active landfill gas collection with flare
- leachate extraction
- on-site leachate treatment
- extraction of ground water from the shallow aquifer adjacent to the landfill
- on-site ground water treatment
- discharge of treated ground water and leachate to river

The selected remedial action will address the principal threats posed by the Site.

#### STATUTORY DETERMINATIONS

The selected remedial action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The remedial action utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedial action will result in hazardous substances remaining on-site, a review will be conducted within five years after commencement of remedial action to insure that the remedial action continues to provide adequate protection of human health and the environment.

  
Valdas V. Adamkus

9/30/93  
Date

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## DECISION SUMMARY

### POWELL ROAD LANDFILL HUBER HEIGHTS, OHIO

#### I. SITE NAME, LOCATION AND DESCRIPTION

The Powell Road Landfill Superfund Site (the Site) is located in Huber Heights, Ohio, a suburb in the northern Dayton metropolitan area of Montgomery County, Ohio. The Site occupies approximately 70 acres on the floodplain of the Great Miami River (see Figure 1). The landfill portion of the Site is located at 4060 Powell Road in Huber Heights, Ohio, and is bordered by Powell Road and residential housing on the north, an intermittent stream to the east, wooded areas to the south and west, and the Great Miami River to the south. The landfill covers roughly 36.3 acres and rises 30 to 40 feet above the surrounding terrain. The nearest residents live in homes owned by the current owner of the landfill. The homes are located approximately 200 feet north of the landfill along Powell Road. A residential area, known as Eldorado Plat, is located south of the landfill in an area immediately south of the Great Miami River.

The Great Miami River flows east to west along the southern boundary of the Site, approximately 150 feet south of the landfill. Two intermittent streams (Stream A and Stream B) to the east of the Site drain south to the river. The Great Miami River is classified as a warm water habitat (OAC 3745-1-21) and is used for agricultural, industrial and primary contact (i.e. wading) purposes.

Geologic materials in the area of the Site are outwash deposits (sand, sand and gravel, and silty sand and gravel), till (unsorted sand, clay, silt and gravel), lacustrine deposits (thin layers of clay, silt and very fine sand) and bedrock (see Figure 3). The outwash deposits constitute the regional aquifer known as the Great Miami River buried valley aquifer (GMR BVA) which has been designated a sole-source aquifer under U.S. EPA's Safe Drinking Water Act (SDWA).

The GMR BVA is locally divided into shallow and primary aquifers. Separation of the two aquifers by confining till deposits occurs under the southern portion of the landfill and under the river. (Hereinafter, these two locally separated aquifers are identified as the shallow aquifer adjacent to the landfill and the primary aquifer adjacent to the landfill.) The confining till deposits are also present south of the river (Eldorado Plat area), however, they are not continuous, therefore only one interconnected aquifer exists in this area. (Hereinafter, the aquifer south of the river (Eldorado Plat area) is identified as the primary aquifer.) Figure 2 identifies the location of hydrogeologic cross-section traces. Figure 3 identifies cross-

sections C-C' (north-south) and J-J' (east-west, Eldorado Plat area) and labels the above-discussed local aquifers.

The GMR BVA is the main source of water supply to the Dayton metropolitan area. Residents located south of the Site, in the area immediately south of the river known as Eldorado Plat, obtain their water from private wells installed in the primary aquifer. Approximately 0.75 miles south of the Site are Ohio Suburban Water Company (OSWC) wells, which supply water to residents in most of Huber Heights and a small portion of Mad River Township. Approximately 1.5 miles south of the Site, the City of Dayton operates wells in the GMR BVA. These wells supply water to residents of Dayton, a number of other local municipalities, and Montgomery County. Approximately 0.5 miles west of the Site the city of Dayton has begun operation of a new well field.

## **II. SITE HISTORY AND ENFORCEMENT ACTIONS**

### **A. SITE HISTORY**

The Site is a former gravel pit which was converted to a landfill in 1959 and operated until 1984 under several different owners. The current owner is SCA Services of Ohio, a subsidiary of Waste Management of North America, Inc. Commercial, industrial, and non-hazardous domestic wastes were disposed of in the landfill. Degradation of these wastes resulted in a release of hazardous substances. It is also believed that improper disposal of certain types of industrial waste have occurred at the landfill, including ink waste, paint sludge, strontium chromate and benzidine. The landfill ceased operation in 1984 and was capped and seeded in 1985.

The Site was proposed for listing on the National Priorities List (NPL) on September 8, 1983 and was final on the NPL on September 21, 1984.

In December, 1984, after identifying contamination in the ground water in the area of the Site, the Ohio EPA requested U.S. EPA's support to determine if an imminent and substantial endangerment to human health or the environment existed. U.S. EPA's Technical Assistance Team (TAT) sampled 46 private residential wells. Sampling results identified low levels of VOCs in 6 residential wells. After reviewing these sampling results, U.S. EPA determined that an imminent and substantial risk to human health and the environment was not present at that time, and emergency actions were not required at that time. However, the U.S. EPA recommended that several activities be conducted in the area, which included conducting a detailed Remedial Investigation of the Powell Road Landfill (see Section V.).

## B. ENFORCEMENT ACTIVITIES

In April, 1986, negotiations began for a 106 Administrative Order on Consent (AOC) under which Potentially Responsible Parties (PRPs) would perform the Remedial Investigation/Feasibility Study (RI/FS) at the Site. These negotiations terminated in May, 1986, and U.S. EPA began performance of the RI/FS at the Site.

During June of 1987, one PRP, SCA Services of Ohio, Incorporated, contacted U.S. EPA and expressed interest in taking over performance of the RI/FS. On November 12, 1987, an AOC was entered into between the U.S. EPA, the Ohio EPA, and SCA Services of Ohio, Incorporated (SCA) (currently a subsidiary of Waste Management of North America, Inc.). This AOC requires SCA to meet a number of requirements, including conducting an RI/FS and paying all past costs associated with the Site. The final RI report was approved in March of 1992 and the FS was approved in March of 1993.

Initial PRP search activities at this Site identified seven (7) PRPs. General Notices of Potential Liability and CERCLA Section 104(e) Information Requests were issued to all seven (7) PRPs on December 2, 1985. Since 1985, U.S. EPA has issued 232 Information Request and 83 follow-up Information Requests. General Notice letters were sent to thirty-seven (37) PRPs in May, 1993.

Additional future Information Requests and follow-up Information Requests will be issued as appropriate. All PRP information which has been gathered to date is being reviewed. Special Notice letters inviting participation in RD/RA negotiations are expected to be issued to appropriate PRPs by U.S. EPA in the near future.

## III. COMMUNITY PARTICIPATION

The public participation requirements of CERCLA sections 113(k)(2)(B)(i-v) and 117 were met in the remedial action selection process by the following:

- A Proposed Plan was finalized and released to the public on May 13, 1993;
- The public was able to comment on the Proposed Plan during a public comment period which started on May 20, 1993 and ended on July 9, 1993 (extended 21 days from original date of June 18, 1993); and
- The public also had the opportunity to participate in a Proposed Plan public meeting held Wednesday, June 2, 1993, in Huber Heights, Ohio.
- An informational letter was sent to all parties on the mailing list on August 23, 1993. The letter discussed residential well sampling which has been conducted at

the Site from 1984 to present and the results of the sampling.

Public interest at the Site has been high since the RI began. In August, 1989 a Technical Assistance Grant was awarded to the Miami Valley Landfill Coalition (MVLC), a local citizen's group. During the RI, MVLC reviewed numerous documents and met with the U.S. EPA and Ohio EPA on several occasions to discuss documents, present their ideas on additional field work, and their interpretations of RI data. MVLC also commented on technologies identified in the FS, and the proposed remedial action presented in the Proposed Plan.

In 1989, when the RI was close to completion, MVLC concerns, which reflect community concerns in general, were a major factor in the U.S. EPA's and Ohio EPA's decision to install and sample additional monitoring wells and resample select existing monitoring and residential wells again. MVLC was concerned that the connection between the Site and ground water contamination identified approximately 4,000 feet south of the landfill, in the Needmore Road area, had been missed. Installation of new monitoring wells was planned specifically with the intent of confirming the existence of any connection. Despite this additional round of sampling, a connection between the Site and the Needmore Road ground water contamination was not identified.

Public comments, verbal and written, received at the public meeting on the Proposed Plan and during the public comment period along with supporting documents, and response to significant comments, are contained in the Responsiveness Summary attached to this ROD.

#### **IV. SCOPE AND ROLE OF RESPONSE ACTION**

The selected remedial action will address the principal threats in contaminated media identified at the Site. These principal threats are landfill gases, contaminated ground water, landfill liquids (leachate) and contaminated soils. The landfill will be covered by an improved landfill cap with a liner which will prevent uncontrolled migration of landfill gases into the air, and prevent infiltration of precipitation into the landfill, thereby reducing the generation of leachate and also reducing the percolation of leachate from the landfill into ground water.

Landfill gases will be actively collected with extraction wells and thermally-treated on site with a flare.

Ground water contamination was identified in the primary and shallow aquifers adjacent to the landfill and in the primary aquifer south of the river (Eldorado Plat area). The selected remedial action will address ground water contamination by

extracting ground water from the shallow aquifer adjacent to the landfill, treating ground water on-site, and discharging treated ground water to the Great Miami River in compliance with NPDES permit requirements.

Leachate is present in the landfill and is a source of ground water contamination adjacent to the Site. Leachate will be extracted from the landfill, treated on-site, and discharged to the Great Miami River in compliance with NPDES permit requirements.

Contaminated soils will be excavated and consolidated on the landfill prior to construction of the landfill cap.

The geology of the Site indicates that ground water contamination identified in the shallow aquifer, adjacent to the landfill, could migrate under the Great Miami River and is a possible source of ground water contamination identified in monitoring wells south of the river (Eldorado Plat area). By extracting and treating leachate from the landfill, and ground water in the shallow aquifer adjacent to the landfill, the two sources of ground water contamination identified in the primary aquifer adjacent to the landfill and south of the river (Eldorado Plat area), will be removed. Once the sources are removed, ground water contamination identified in the primary aquifer adjacent to the landfill and south of the river (Eldorado Plat area), is expected to decrease and meet cleanup levels.

A ground water monitoring network will be established on the Site (around the landfill and south of the river (Eldorado Plat area)). The purpose of ground water monitoring is to: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (primary and shallow aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

The selected remedial action is expected to be the final response for the Site. Because this remedial action will result in hazardous substances remaining on-site, a review will be conducted within five years after commencement of remedial action to insure that the remedial action continues to provide adequate protection of human health and the environment.

## V. SUMMARY OF SITE CHARACTERISTICS

The RI determined the nature and extent of on-site and off-site contamination, and estimated the risks posed by the Site to human health and the environment. The RI Report, finalized in February, 1992, identified the following on-site and off-site contamination:

### ON-SITE (contamination associated with the Site)

- Landfill gases consisting of methane with detectable concentrations of volatile organic compounds (VOCs)
- Leachate consisting of VOCs, semivolatile organic compounds, and inorganic compounds
- Surface and near-surface soils which contain semivolatile organics, pesticides, and polychlorinated biphenyls (PCBs).
- Shallow and primary aquifers adjacent to the landfill contain VOCs
- Primary aquifer south of the river (Eldorado Plat area) contains VOCs

### OFF-SITE (contamination not associated with the Site)

- Primary aquifer south of the river (Needmore Road area) contains VOCs. A connection between the Site and contamination found in this area could not be confirmed and is therefore not addressed by the final remedial action.

#### A. ON-SITE

The Powell Road Landfill is the source of ground water contamination found in the immediate vicinity of the landfill and is responsible for the generation of landfill gases and leachate. The landfill consists of approximately 2.6 million cubic yards of material.

Landfill gases found in the landfill gas vents and air at the Site consisted mostly of methane with detectable concentrations of volatile organic compounds (VOCs). Figure 4 shows the locations of gas vents and the total VOC concentrations found in the gas vents. Table 1 shows concentrations of methane detected in gas vents and Table 2 shows concentrations of VOCs detected in gas vents.

Thirteen samples of leachate were collected from gas vents in the landfill (Figure 5). Analysis identified VOCs (Table 3),



semivolatile compounds (Table 4), metals, and other inorganics (Table 5). Figure 5 shows the leachate/ground water total VOC concentrations at the Site.

One sample of leachate was collected from the landfill surface. Analysis identified VOCs, semivolatile compounds, metals, and other inorganics. Table 6 presents the results of the surface leachate sample analysis.

The chemicals and concentrations found in the surface leachate were essentially the same as the leachate collected from gas vents. Therefore, surface leachate and leachate collected from gas vents are grouped together in further discussions.

Ambient air samples were collected at the Site (Figure 6). Results identified trace amounts of VOCs (Table 7).

Eight sediment samples were collected from surface water bodies on and around the Site (Figure 7). Analysis showed no impact from the landfill in the form of VOCs or inorganic contaminants (Table 8). Several semivolatiles were detected in both upstream and downstream sediment samples.

Surface water samples were collected from the same locations as sediment samples (Figure 7). Analysis showed no impact from the landfill in the form of VOCs, semivolatile compounds, or inorganic contaminants (Table 9).

Thirty-two surface soil samples and twelve sub-surface soil samples were collected on the Site and in surrounding areas (Figure 8). Surface and near-surface soils at the Site contain semivolatile organics, pesticides and PCBs at limited locations (Tables 10 and 11). Figure 9 identifies the location and approximate extent of surface and subsurface soils contamination.

Ground water quality was investigated by analyzing water sampled from 44 new and existing monitoring wells (four sampling events) and 30 residential and water supply wells on two occasions.

VOCs were the major contaminant group found in ground water. A total of 15 VOCs were detected in ground water samples collected during the RI.

VOCs were detected in six monitoring wells in the shallow aquifer adjacent to the landfill and in two monitoring wells in the primary aquifer adjacent to the landfill (Table 12).

VOCs were identified in the primary aquifer south of the river (Eldorado Plat area) during the last sampling round (Table 13).

Ground water sample analyses identified that MCLs were exceeded for two VOCs (vinyl chloride and trichloroethene) and two metals (aluminum and beryllium).

Ground water samples obtained during the RI, from residential wells south of the river (Eldorado Plat area) did not identify any contamination. Additional ground water samples of residential wells in the Eldorado Plat area were collected and analyzed in March, 1993. VOCs were detected in one residential well. Similar levels of the same VOCs were found in this well prior to the RI, but were not detected during the RI sampling of the well.

### B. OFF-SITE

VOCs were identified in ground water 4,000 feet south of the landfill (Needmore Road area) (Figure 10). The VOCs identified in the Needmore Road area consisted mainly of "ethene" VOCs. The ground water contamination found in the Needmore Road area could not be connected to contamination found on the Site. If the Site were the source of ground water contamination found in the Needmore Road area, ground water contaminants would have been found between the Site and the Needmore Road area. Additionally, dispersion of contaminants caused by migration from the Site to the Needmore Road area would occur, and downgradient contaminants in the Needmore Road area, would be equal-to, or more likely, less-than the ground water contamination found on the Site. However, ground water contamination was not found between the Needmore Road area and the Site, nor were the Needmore Road area ground water contamination levels equal-to or less-than contamination found at the Site. The "ethene" VOC contaminants found in the Needmore Road area were found at levels up to 4-times greater than "ethene" VOCs found in ground water adjacent to the landfill.

However, if in the future a connection is found which identifies PRL as the source of contamination in the Needmore Road area, either a ROD amendment or an Explanation of Significant Differences will be prepared, as appropriate.

## VI. SUMMARY OF SITE RISKS

RI data identified the following contaminated media: air, surface and near-surface soils, and ground water. The RI data from each media was evaluated to select chemicals of potential concern (CPCs). CPCs are those chemicals present at the Site most likely to be of concern to human health and the environment. CPCs were selected based on a comparison of contaminants found in each media to background and blank sample data for each media. Table 14 (organics) and Table 15 (inorganics) summarize the CPCs selected for each media. (See RI

Report, section 6.2, for tables summarizing RI data for each media and CPCs for each media.)

Based on the results of the RI, U.S. EPA and Ohio EPA directed the PRPs in calculating the risks that the Site would pose to human health and the environment if no remedial actions were taken at the Site. This process is called the Baseline Risk Assessment (Risk Assessment). Risk assessment involves assessing the toxicity, or degree of hazard, posed by the substances found at the Site, and the routes by which humans and the environment could come into contact with these substances.

The primary sources of uncertainty in the preparation of a risk assessment are:

- Environmental sampling and analysis, and selection of chemicals
- Exposure parameter estimation
- Toxicological data

See the RI Report, Section 6.0, for specific information on the Baseline Risk Assessment prepared during the RI/FS.

#### A. HUMAN HEALTH RISKS

##### 1. Exposure Assessment

Potential pathways by which human populations may be exposed to chemicals at or originating from the Site were identified under both current use and potential future residential land-use conditions. Twelve complete exposure pathways were selected for detailed evaluation under current use conditions. Current use conditions were determined, and are presented, in the RI Report. These pathways are:

- Incidental ingestion of chemicals in surface soil by trespassers on-site,
- Dermal absorption of chemicals in surface soil by trespassers on-site,
- Inhalation of volatile organic chemicals emitted from the landfill by trespassers on-site,
- Inhalation of volatile organic chemicals emitted from the landfill by nearby residents,
- Incidental ingestion of chemicals in intermittent stream A and Great Miami River sediment by nearby residents,

- Dermal absorption of chemicals in intermittent stream A and Great Miami River sediment by nearby residents,
- Incidental ingestion of chemicals in intermittent stream A and Great Miami River (backwater area) surface water by nearby residents,
- Dermal absorption of chemicals in intermittent stream A and Great Miami River (backwater area) surface water by nearby residents,
- Ingestion of fish from the Great Miami River (backwater area) by nearby residents,
- Ingestion of ground water by nearby residents,
- Inhalation of volatile organic chemicals by nearby residents while showering, and
- Dermal absorption of chemicals in ground water while showering by nearby residents.

Six complete exposure pathways were selected for detailed evaluation under potential future residential land-use conditions. Future residential land-use conditions were determined, and are presented, in the RI Report. These pathways are:

- Incidental ingestion of surface soils by a hypothetical on-site resident,
- Dermal absorption of chemicals in surface soils by a hypothetical on-site resident,
- Inhalation of volatile organic chemicals emitted from the landfill by a hypothetical on-site resident,
- Ingestion of ground water by a hypothetical on-site resident,
- Inhalation of volatile organic chemicals by a hypothetical on-site resident while showering, and
- Dermal absorption of chemicals in ground water while showering by a hypothetical on-site resident.

Representative exposure point concentrations were developed for the CPCs and each media based on RI data. The chronic daily intake (CDI) of each chemical was estimated to assess exposure associated with the selected pathways. (See RI Report, section 6.4, for tables identifying the exposure point concentrations and resulting CDI for each CPC.) The exposures are quantified by

estimating the reasonable maximum exposure (RME) associated with pathways of concern. RME is a conservative estimate of potential risk.

## 2. Toxicity Assessment

Toxicity information was compiled for each chemical of potential concern. Individual chemicals were separated into two categories of chemical toxicity based on whether they exhibited principally noncarcinogenic or carcinogenic effects. Next, the health effects of both categories of chemicals were evaluated. Table 16 presents oral health effects criteria for the chemicals of potential concern. Table 17 presents inhalation health effects criteria for the chemicals of potential concern.

## 3. Risk Characterization

Potential human health risks for carcinogenic and noncarcinogenic chemicals of potential concern were calculated for each pathway identified under current use and future residential land-use exposures. (See RI Report, section 6.5, for tables identifying chemical-specific carcinogenic and non-carcinogenic risks for current use and future residential land-use exposure pathways.)

The Risk Assessment estimates the excess risk, posed by the Site, of getting cancer, over and above the average risk. Cancer risks from various exposure pathways are assumed to be additive. Excess lifetime cancer risks less than  $1 \times 10^{-6}$  (one-in-one million) are considered acceptable by U.S. EPA. Excess lifetime cancer risks between  $1 \times 10^{-4}$  (one-in-ten thousand) to  $1 \times 10^{-6}$  require U.S. EPA and Ohio EPA (the Agencies) to decide if remediation is necessary to reduce risks and to what levels cleanup will occur. Excess lifetime cancer risks greater than  $1 \times 10^{-4}$  generally require remediation.

For noncarcinogens, potential risks are expressed as a hazard index. A hazard index represents the sum of all ratios of the level of exposure of the contaminants found at the Site to that of contaminants' various reference doses. In general, hazard indices which are less than one are not likely to be associated with any health risks.

Ground water chemical concentrations found in monitoring wells adjacent to the landfill and in the Eldorado Plat area were compared to U.S. EPA drinking water standards (maximum contaminant levels (MCLs)). Three of the 19 chemicals of concern in monitoring wells adjacent to the landfill were detected at concentrations which exceed MCLs. One of the five chemicals of potential concern in the Eldorado Plat monitoring wells exceeded MCLs. See Table 18 for results.

Although RI data does not support a connection between ground water contamination located on the Site and the ground water contamination found in Needmore Road area, U.S. EPA requested risk calculations be performed on ground water data from the Needmore Road area. These risk calculations are included in the RI Report, and will no longer be discussed in this section.

Under current use conditions the excess lifetime cancer risks were within a  $10^{-6}$  to  $10^{-4}$  cancer risk range for the following pathways (Table 19):

- inhalation of landfill gas emissions by nearby residents;
- dermal absorption through contact with Great Miami River surface water by nearby child/teenager residents;
- dermal absorption through contact with Great Miami River surface water by nearby adult residents;
- dermal absorption through contact with Stream A surface water by a nearby adult resident;
- inhalation of volatiles from showering with ground water in the Eldorado Plat area (based on monitoring well data);
- ingestion of ground water in the Eldorado Plat area (based on monitoring well data);

Under current use conditions, the excess lifetime cancer risks exceeded  $10^{-4}$  for the following current use pathways:

- ingestion of fish caught from the backwater area of the Great Miami River;

Under current use conditions, the hazard index value was greater than one for the following current use pathways:

- ingestion of fish caught from the backwater area of the Great Miami River;

The current use risks shown in Table 19 have also been summarized across pathways for several potential receptor populations. For the combination of pathways shown in Table 19, the excess lifetime cancer risks exceeded a cancer risk level of  $10^{-4}$  and the hazard index value of one for residents who live in the Eldorado Plat area. This receptor population's increased carcinogenic and noncarcinogenic risk is based on the regular ingestion of fish caught from the backwater area of the Great Miami River.

Under future residential land-use conditions the excess lifetime cancer risks were within a  $10^{-6}$  to  $10^{-4}$  cancer risk range for the following future residential land-use pathways (Table 20):

- Incidental ingestion of on-site surface soil;
- dermal adsorption while showering with on-site ground water (based on leachate data);
- inhalation of landfill gas emissions; and
- ingestion of on-site ground water (based on leachate data).

Under future residential land-use conditions, the excess lifetime cancer risks did not exceed a  $10^{-4}$  cancer risk level for any future residential land-use pathways.

Under future residential land-use conditions, the hazard index value was greater than one for the following future residential land-use pathway:

- ingestion of on-site ground water (based on leachate data)

The future residential land-use risks shown in Table 20 have also been summarized across pathways for the hypothetical on-site resident. For this potential receptor, the excess lifetime cancer risks was  $10^{-4}$  and the hazard index value was greater than one.

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD may present an imminent and substantial endangerment to public health, welfare, or the environment.

## B. ECOLOGICAL RISK ASSESSMENT

An ecological assessment was conducted to evaluate the potential risks to non-human receptors associated with the Site. Potential receptors and exposure pathways were evaluated, including the presence of endangered or threatened species in the area. A site survey was conducted during the RI to identify terrestrial and aquatic receptors. The following indicator species and exposure pathways were selected for detailed evaluation: plants exposed to surface soil, soil organisms (earthworms were used as indicator species), and aquatic organisms (fish and aquatic invertebrates) in surface water and sediment of the Great Miami River and intermittent Stream A. Based on available toxicity information [for four inorganic chemicals for plants based on Kebata-Pendias and Pendias (1984) and Adriano (1986) and one inorganic and one organic chemical for earthworms based on

Malecki et al. (1982) and van Rhee (1977)], adverse effects to plants and earthworms from exposure to soil are unlikely to occur. Ambient water quality criteria was equalled or exceeded for modeled concentrations of PCBs and DDT in the backwater area of the Great Miami River. Ambient water quality criteria was equalled or exceeded for measured concentrations of mercury in intermittent Stream A. Adverse impacts to most species of fish and aquatic invertebrates are, however, not expected to occur.

The Ohio Department of Natural Resources had no records of rare or endangered species in the area of the Site. The U.S. Fish and Wildlife Service did not have endangered species information specific to the area where the Site is located; however, the Indiana Bat is an endangered species that occurs in numerous counties in Ohio, including Montgomery County, and may be present at the Site.

### C. RISK-BASED CLEANUP LEVELS

Based on the above information, risk-based cleanup levels were developed and are listed on Table 21. These cleanup levels were calculated for each individual compound based on a  $10^{-4}$  risk and a  $10^{-6}$  risk. Risk-based cleanup levels were calculated using U.S. EPA's Risk Assessment Guidance for Superfund, Part B, dated December 1991.

Final cleanup levels for individual contaminants in all media will be chemical-specific ARARs (see Section X.B.1). If multiple contaminants are present in a media, and cleanup of individual contaminants to ARARs result in a cumulative risk in excess of  $10^{-4}$  across a media, cleanup levels of contaminants will be risk-based and cumulative across a media to  $1 \times 10^{-4}$  or less (Table 21). If chemical-specific ARARs do not exist for contaminants, cleanup levels of contaminants will be risk-based and cumulative across a media to  $1 \times 10^{-4}$  or less (Table 21).

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to human health and the environment.

### VII. DESCRIPTION OF ALTERNATIVES

A feasibility study was conducted to develop and evaluate remedial alternatives for the Powell Road Landfill. Remedial alternatives were assembled from applicable remedial technology process options and were initially evaluated for effectiveness, implementability and cost. The alternatives meeting these criteria were then evaluated and compared to the nine criteria required by the NCP (See Section VIII.). Treatability studies were not performed during the RI or the FS, and are not anticipated to be a necessary part of implementation of any of



the alternatives for this Site. In addition to the remedial alternatives, the NCP requires that a no-action alternative be considered at every Site. The no-action alternative serves primarily as a point of comparison for other alternatives.

#### **Alternative 1**

Description: No Action

Estimated Capital Cost:	\$0
Estimated Annual O&M Costs:	\$0
Estimated Present-Worth Costs:	\$0
Estimated Implementation Timeframe:	None

This alternative does not take any action to remediate the Site and does not consist of any treatment components, engineering controls, monitoring, or institutional controls.

#### **Alternative 2**

Description: Institutional controls, improved landfill cap with liner, consolidation of contaminated soils under landfill cap, ground water monitoring, flood protection, storm water controls, active gas collection with flare.

The treatment component of this alternative is landfill gas treatment. Landfill gas will be actively collected by gas extraction wells installed in the landfill and treated thermally on-site via a flare. The estimated volume of landfill gases to be treated is 850 cubic feet/minute (cfm).

The containment component is capping the landfill with an improved landfill cap with liner in accordance with Ohio EPA Solid Waste Management Regulations (OAC-3745-27-11(G)). The landfill cap will prevent migration of contaminated soils into surface water, reduce infiltration of precipitation into the landfill thereby reducing generation of leachate and also reducing the percolation of leachate from the landfill into ground water.

Ground water contamination and leachate are not addressed in this alternative.

The preliminary screening of alternatives indicated that Alternative 2 does not provide overall protection of human health and the environment, therefore, Alternative 2 was screened out of the detailed analysis of alternatives (see Feasibility Study for details). Costs were not developed for Alternative 2.

### **Common Components**

Alternatives 3, 4, 5, 6, and 7, described below, include the following common components:

#### **1. Institutional Controls**

Institutional controls include fencing, deed restrictions, and warning signs. Site access will be controlled by an 8-foot chain-link fence topped with barbed wire. Warning signs will be posted to discourage unauthorized entry onto the Site. Deed restrictions will prohibit disturbance of the Site and preclude future development of the Site.

#### **2. Flood Protection**

Erosion control measures will be implemented during and after construction to ensure the reduction of flood water velocity during future flooding.

#### **3. Storm Water Controls**

Storm water control measures will be implemented and may consist of runoff control berms and rip-rap-lined discharge ditches.

#### **4. Improved Landfill Cap with Liner**

An improved landfill cap with liner will be constructed over the landfill in accordance with the Ohio EPA's Solid Waste Management Regulations. The landfill consists of approximately 2.6 million cubic yards of material. The landfill cap will prevent migration of contaminated soils into surface water, reduce infiltration of precipitation into the landfill thereby reducing generation of leachate and also reducing the percolation of leachate from the landfill into ground water.

#### **5. Ground Water Monitoring**

A ground water monitoring network will be established on the Site (around the landfill and south of the river (Eldorado Plat area)). Existing monitoring wells, new monitoring wells, and select residential wells may be used to monitor upgradient and downgradient ground water conditions. Ground water monitoring will serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site. The specifics of the ground water monitoring system, including frequency and duration, will be determined during the remedial design.

#### **6. Consolidation of Contaminated Soils Under Landfill Cap**

Approximately 600 cubic yards of soil contaminated with DDT and/or PCBs will be excavated and consolidated on the top of the landfill and then covered by the landfill cap. The areas currently identified for excavation and consolidation are within

approximately 400 feet of the landfill (see Figure 9). The Resource Conservation and Recovery Act (RCRA) land disposal restrictions (LDRs) are not an ARAR for excavation of soils around the landfill and consolidation of the soils under the landfill cap because the soils being removed are from one "area of contamination (AOC)". This AOC consists of the landfill, surrounding contaminated soils, leachate and contaminated ground water. Movement of waste within the AOC does not constitute placement.

#### 7. Active Gas Collection and Treatment with Flare

An estimated 850 cubic feet per minute of landfill gases will be actively collected with gas extraction wells and thermally treated on-site via a flare. The system will be designed to comply with the Clean Air Act, Section 101 and 40 CFR 52.

#### 8. Leachate Extraction

Leachate will be extracted from the landfill at a rate sufficient to create a slight influx of ground water into the landfill and prevent migration of leachate out of the landfill. A series of vertical extraction wells will be installed in the landfill and screened in the permeable water-bearing zones. Leachate will be collected by a system of piping buried under the landfill cap and will be temporarily stored in a holding tank prior to treatment. The leachate extraction system may remove up to 50,000 gallons per day (gpd) of leachate from the landfill.

#### 9. Leachate Treatment

The leachate treatment system will be designed to remove volatile organic compounds, semivolatile organic compounds, and metals. The leachate treatment system may consist of a system of biological bulk organic removal and metals removal, with remaining volatile and semi-volatile organic removal by air stripping and activated carbon treatment, respectively. Details of the leachate treatment system will be identified during the remedial design. Leachate will be treated to levels which will allow discharge of effluent to the river under the NPDES permit requirements (see discussion below). The leachate treatment system could remove an estimated 1,100 lbs. total of VOCs from the leachate.

#### 10. Discharge

Treated leachate effluent will be discharged to the Great Miami River. Discharge will comply with all Federal and State of Ohio National Pollutant Discharge Elimination System (NPDES) requirements (40 CFR 122.44, Clean Water Act Section 208, 40 CFR 125, 40 CFR 136, Ohio Revised Code). NPDES requires compliance with state and federal water quality standards, whichever is more stringent, and regulates discharge into surface water.

### Alternative 3

Description: Institutional controls, improved landfill cap with liner, consolidation of contaminated soils under landfill cap, ground water monitoring, flood protection, storm water controls, active gas collection with flare, leachate extraction, on-site leachate treatment, discharge to river.

Estimated Capital Cost:	\$11,463,000
Estimated Annual O&M Costs:	\$ 398,000
Estimated Present-Worth Costs:	\$16,820,000
Estimated Implementation Timeframe:	6 years

This alternative consists of all the common elements described above and addresses landfill gas, contaminated soils, and leachate. Existing ground water contamination will not be actively remediated. Ground water monitoring will evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water.

Final cleanup levels for individual contaminants in each media, ground water, leachate, and air, will be chemical-specific ARARs (see Section X.B.1.). If multiple contaminants are present in a media, and cleanup of individual contaminants to ARARs result in a cumulative risk in excess of  $10^{-4}$  across a media, cleanup levels of contaminants will be risk-based and cumulative across a media to  $1 \times 10^{-4}$  or less (Table 21). If chemical-specific ARARs do not exist for contaminants, cleanup levels of contaminants will be risk-based and cumulative across a media to  $1 \times 10^{-4}$  or less (Table 21). The point of compliance for ground water cleanup levels will be at the boundary of the landfill. Ground water cleanup levels shall be achieved at and beyond the landfill boundary. The point of compliance for cleanup levels of landfill gas emissions shall be the fence surrounding the landfill.

Treatment components include landfill gas treatment via flare and leachate treatment. Landfill gases will be actively collected with gas extraction wells and thermally treated on-site via a flare. Leachate will be extracted from the landfill at a rate sufficient to create a slight influx of ground water into the landfill and prevent migration of leachate out of the landfill. A series of vertical extraction wells will be installed in the landfill and screened in the permeable water-bearing zones. Leachate will be collected by a system of piping buried under the landfill cap and will be temporarily stored in a holding tank prior to treatment.

The containment components are consolidation of contaminated soils on top of the landfill, and an improved landfill cap with liner. Contaminated soils will be excavated and consolidated on top of the landfill followed by construction of an improved landfill cap with liner. The landfill cap will comply with Ohio

## EPA's Solid Waste Management Regulations.

### Alternative 4

Description: Institutional controls, improved landfill cap with liner, consolidation of contaminated soils under landfill cap, ground water monitoring, flood protection, storm water controls, active gas collection with flare, leachate extraction, on-site leachate treatment, extraction of ground water from the shallow aquifer adjacent to the landfill, on-site ground water treatment, discharge to river.

Estimated Capital Cost:	\$12,911,000
Estimated Annual O&M Costs:	\$ 544,000
Estimated Present-Worth Costs:	\$20,510,000
Estimated Implementation Timeframe:	6 years

This alternative consists of all the components of Alternative 3 with the addition of ground water extraction from the shallow aquifer adjacent to the landfill, on-site ground water treatment, and discharge of treated effluent to the river. This alternative addresses landfill gas, contaminated soils, leachate and contaminated ground water in the shallow aquifer adjacent to the landfill. Existing ground water contamination in the primary aquifer, adjacent to the landfill and south of the river (Eldorado Flat area), will not be actively remediated. Ground water monitoring will evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks posed by existing ground water contamination.

Final cleanup levels for individual contaminants in each media are the same as discussed in Alternative 3.

Treatment components include landfill gas treatment via flare and leachate treatment, as discussed in Alternative 3 above, and ground water extraction from the shallow aquifer and ground water treatment on-site. An estimated 400,000 gallons of ground water will be pumped per day from extraction wells in the shallow aquifer adjacent to the landfill, treated on-site, and effluent discharged to the river (in compliance with all NPDES requirements).

The containment components are consolidation of contaminated soils on top of the landfill, and an improved landfill cap with liner, as discussed above in Alternative 3.

### **Alternative 5**

Description: Institutional controls, improved landfill cap with liner, treatment of contaminated soils, consolidation of treated soils under landfill cap, ground water monitoring, flood protection, storm water controls, active gas collection with flare, leachate extraction, on-site leachate treatment, extraction of ground water from the shallow and primary aquifers adjacent to the landfill, on-site ground water treatment, discharge to river.

Estimated Capital Cost:	\$13,884,000
Estimated Annual O&M Costs:	\$ 618,000
Estimated Present-Worth Costs:	\$22,620,000
Estimated Implementation Timeframe:	6 years

This alternative consists of all the components of Alternative 4 with the addition of ground water extraction from the primary aquifer adjacent to the landfill and treatment of contaminated soils prior to placement under the landfill cap. This alternative addresses landfill gas, contaminated soils, leachate, and contaminated ground water in the shallow and primary aquifers adjacent to the landfill. Existing ground water contamination in the primary aquifer south of the river (Eldorado Plat area), will not be actively remediated. Ground water monitoring will evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water.

Final cleanup levels for individual contaminants in each media are the same as discussed in Alternative 3.

Treatment components include landfill gas treatment via flare, leachate treatment, and ground water treatment, as discussed above in Alternative 4, and treatment of contaminated soils prior to consolidation under the landfill cap. An estimated 600 cubic yards of contaminated soils will be treated to dewater, stabilize and solidify the contaminated soils prior to placement under the landfill cap. This alternative also includes the extraction of ground water from the primary aquifer adjacent to the landfill. An estimated 900,000 gallons of ground water will be pumped per day from extraction wells in the shallow and primary aquifers adjacent to the landfill, treated on-site and effluent discharged to the river (in compliance with all NPDES requirements).

The containment components are consolidation of treated soils on top of the landfill, and an improved landfill cap with liner as discussed above in Alternative 3.

### Alternative 6

Description: Institutional controls, improved landfill cap with liner, treatment of contaminated soils, consolidation of treated soils under landfill cap, ground water monitoring, flood protection, storm water controls, active gas collection with flare, leachate extraction, on-site leachate treatment, ground water extraction from the primary aquifer south of the river (Eldorado Plat area), on-site ground water treatment, discharge to river.

Estimated Capital Cost:	\$12,600,000
Estimated Annual O&M Costs:	\$ 519,000
Estimated Present-Worth Costs:	\$19,810,000
Estimated Implementation Timeframe:	8 years

This alternative consists of all the components of Alternative 3 with the addition of ground water extraction from the primary aquifer south of the river (Eldorado Plat area), on-site ground water treatment, discharge of treated effluent to the river, and treatment of contaminated soils prior to consolidation under the landfill cap. This alternative addresses landfill gas, contaminated soils, leachate and contaminated ground water south of the river (Eldorado Plat area). Existing ground water contamination in the shallow and primary aquifers adjacent to the landfill will not be actively remediated. Ground water monitoring will evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water.

Final cleanup levels for individual contaminants in each media are the same as discussed in Alternative 3.

Treatment components include landfill gas treatment via flare, leachate treatment, ground water treatment, and treatment of contaminated soils prior to consolidation under the landfill cap as discussed above in Alternative 5. The ground water treatment component of this alternative includes the extraction of ground water from the primary aquifer south of the river (Eldorado Plat area). An estimated 250,000 gallons of ground water will be pumped per day from extraction wells in the primary aquifer south of the river (Eldorado Plat area), treated on-site and effluent discharged to the river (in compliance with all NPDES requirements). Ground water extracted from the primary aquifer south of the river (Eldorado Plat area) will be piped across the river for on-site treatment.

The containment components are consolidation of treated soils on top of the landfill, and an improved landfill cap with liner as discussed above in Alternative 3.

### Alternative 7

Description: Institutional controls, improved landfill cap with liner, treatment of contaminated soils, consolidation of treated soils under landfill cap, ground water monitoring, flood protection, storm water controls, active gas collection with flare, leachate extraction, on-site leachate treatment, extraction of ground water from the shallow and primary aquifers adjacent to the landfill and from the primary aquifer south of the river (Eldorado Plat area), on-site ground water treatment, discharge to river.

Estimated Capital Cost:	\$14,341,000
Estimated Annual O&M Costs:	\$ 617,000
Estimated Present-Worth Costs:	\$23,060,000
Estimated Implementation Timeframe:	8 years

This alternative consists of all the components of Alternative 5 with the addition of ground water extraction from the primary aquifer south of the river (Eldorado Plat area). This alternative addresses landfill gas, contaminated soils, leachate, contaminated ground water in the shallow and primary aquifers adjacent to the landfill, and contaminated ground water in the primary aquifer south of the river (Eldorado Plat area). Ground water monitoring will evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water.

Final cleanup levels for individual contaminants in each media are the same as discussed in Alternative 3.

Treatment components include landfill gas treatment via flare, leachate treatment, ground water treatment, and treatment of contaminated soils prior to consolidation under the landfill cap as discussed above in Alternative 5. This alternative includes the extraction of ground water from the primary aquifer south of the river (Eldorado Plat area). Ground water treatment for this alternative includes extraction of an estimated 1,150,000 gallons of ground water per day from extraction wells in the shallow and primary aquifers adjacent to the landfill, and extraction wells in the primary aquifer south of the river (Eldorado Plat area), on-site treatment and discharge of effluent to the river (in compliance with all NPDES requirements). Ground water extracted from the primary aquifer south of the river (Eldorado Plat area) will be piped across the river for on-site treatment.

The containment components are consolidation of treated soils on top of the landfill, and an improved landfill cap with liner as discussed above in Alternative 3.



## **VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES**

The remedial alternatives developed in the FS were evaluated on the basis of the nine evaluation criteria listed below. The advantages and disadvantages of each alternative were then compared to determine which alternative provides the best balance among these nine criteria. The nine evaluation criteria are set forth in the National Contingency Plan (NCP), 40 CFR Part 300.430.

### **THRESHOLD CRITERIA:**

#### **1. Overall Protection of Human Health and the Environment**

Overall protection of human health and the environment addresses whether a remedial action provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

Alternative 1 does not meet this criteria because it does not take any action to protect human health and the environment and does not eliminate, reduce or control risks.

Alternative 2 does not eliminate, reduce or control risks associated with ground water contamination and leachate migration into ground water. Alternative 2 was determined not to be protective of human health and the environment and was screened out from the detailed analysis of alternatives. Alternative 2 will no longer be discussed in this document.

Alternatives 3, 4, 5, 6 and 7 utilize institutional controls to reduce risks posed to trespassers by fencing the Site and posting warning signs, and reduce the risks posed to potential future users of the Site by imposing deed restrictions on the landfill property.

Alternatives 3, 4, 5, 6, and 7 utilize numerous source controls: landfill cap; landfill gas collection and treatment; leachate collection and treatment; and consolidation of soils under landfill cap. The risks posed by inhalation of landfill gases are reduced by collecting and treating landfill gases. The risks posed by contaminated ground water will be reduced by extracting and treating leachate from the landfill, the source of ground water contamination. The landfill cap will reduce ground water risks by reducing infiltration of precipitation into the landfill, thereby reducing generation of leachate, and also reducing the percolation of leachate from the landfill into ground water. The risks posed by ingestion of fish are based on the potential migration of contaminated soils into surface water and sediment. These risks will be controlled and reduced by

excavating and consolidating contaminated soils under the landfill cap. Alternatives 5, 6 and 7 also provide additional reduction of these risks by treating contaminated soils on-site to dewater, stabilize and solidify the soils prior to consolidation under the landfill cap.

Alternative 3 does not utilize treatment to actively reduce risks associated with existing ground water contamination. Several components of this alternative, however, will interact to address and decrease ground water contamination and achieve cleanup levels. The landfill cap will reduce infiltration of precipitation into the landfill, thereby reducing generation of leachate, and also reducing the percolation of leachate from the landfill into ground water. Leachate in the landfill and ground water in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer adjacent to the landfill and south of the river (Eldorado Plat area). Extraction and treatment of leachate from the landfill will address one of the primary sources of ground water contamination and risks associated with ground water contamination. Once the landfill cap is constructed and the landfill gas and leachate extraction/treatment systems are operational, a minimum of 6 years will be required to decrease ground water contamination and achieve ground water cleanup levels in the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area). Ground water monitoring will serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

Alternatives 4, 5, 6 and 7 utilize ground water treatment technologies to further reduce risks posed by existing ground water contamination.

Alternative 4 reduces risks associated with ground water contamination by extracting and treating ground water from the shallow aquifer adjacent to the landfill. Existing ground water contamination in the primary aquifer, adjacent to the landfill and south of the river (Eldorado Plat area), will not be actively remediated. Several components of this alternative, however, will interact to address and decrease ground water contamination and achieve cleanup levels. The landfill cap will reduce infiltration of precipitation into the landfill, thereby reducing generation of leachate, and also reducing the percolation of leachate from the landfill into ground water. Leachate and ground water in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer, adjacent to the landfill and south of the

river (Eldorado Plat area). Extraction and treatment of leachate from the landfill and ground water from the shallow aquifer adjacent to the landfill will address the primary sources of ground water contamination and risks posed by ground water contamination in the shallow aquifer (adjacent to the landfill). Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, a minimum of 6 years will be required to decrease ground water contamination and achieve ground water cleanup levels in the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area). Ground water monitoring will serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

Alternative 5 reduces risks associated with ground water contamination by extracting and treating ground water in the shallow and primary aquifers adjacent to the landfill. Existing ground water contamination in the primary aquifer south of the river (Eldorado Plat area) will not be actively remediated. Several components of this alternative, however, will interact to address and decrease ground water contamination and achieve cleanup levels. The landfill cap will reduce infiltration of precipitation into the landfill, thereby reducing generation of leachate, and also reducing the percolation of leachate from the landfill into ground water. Leachate and ground water in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer, adjacent to the landfill and south of the river (Eldorado Plat area). Extraction and treatment of leachate from the landfill and ground water from the shallow and primary aquifers adjacent to the landfill will address the primary sources of ground water contamination and risks posed by ground water contamination in the shallow aquifer (adjacent to the landfill). Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, a minimum of 6 years will be required to decrease ground water contamination and achieve ground water cleanup levels in the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area). Ground water monitoring will serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

Alternative 6 reduces risks associated with ground water contamination by extracting ground water from the primary aquifer south of the river (Eldorado Plat area) and treating ground water on-site. Existing ground water contamination adjacent to the landfill, in the shallow and primary aquifers, will not be actively remediated. Several components of this alternative, however, will interact to address and decrease ground water contamination and achieve cleanup levels. The landfill cap will reduce infiltration of precipitation into the landfill, thereby reducing generation of leachate, and also reducing the percolation of leachate from the landfill into ground water. Leachate and ground water in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer, adjacent to the landfill and south of the river (Eldorado Plat area). Extraction and treatment of leachate from the landfill will address the one of the primary sources of ground water contamination and risks posed by ground water contamination in the shallow aquifer (adjacent to the landfill). Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, a minimum of 8 years will be required to decrease ground water contamination and achieve ground water cleanup levels in the shallow and primary aquifers adjacent to the landfill and in the primary aquifer south of the river (Eldorado Plat area). Ground water monitoring will serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

Alternative 7 reduces risks associated with ground water contamination by extracting ground water, in the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area), and treating ground water on-site. Leachate and ground water in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer, adjacent to the landfill and south of the river (Eldorado Plat area). Extraction and treatment of leachate from the landfill and ground water from the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area) will address the primary sources of ground water contamination and risks posed by ground water contamination in the shallow aquifer (adjacent to the landfill). Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, a minimum of 8 years will be required to decrease ground water contamination and achieve ground water cleanup levels in the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area). Ground water monitoring will

serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

## 2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Applicable requirements are those cleanup standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal or State environmental or facility siting law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal or State environmental siting law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to this particular Site.

Compliance with ARARs addresses whether a remedial action will meet all requirements of federal and state environmental laws and regulations and/or provide a basis for a waiver from any of these laws. Federal and State ARARs are divided into three categories: chemical-specific, action-specific, and location-specific.

### Chemical-Specific ARARs

Federal: Table 22 identifies the federal chemical-specific ARARs. The ground water cleanup levels for Alternatives 3, 4, 5, 6, and 7 will comply with the Safe Drinking Water Act (SDWA) (Note: only non-zero SDWA levels are potential ARARs) and RCRA ground water ARARs by treating leachate and/or ground water treatment. Ground water monitoring will continue until contamination decreases and cleanup levels are achieved. Alternative 3 will rely on treatment/containment components of the remedy to decrease ground water contamination and achieve cleanup levels in ground water adjacent to the landfill (shallow and primary aquifers) and south of the river (Eldorado Plat area) (primary aquifer). Alternative 4 will treat ground water extracted from the shallow aquifer adjacent to the landfill and rely on treatment/containment components of the remedy to decrease ground water contamination and achieve cleanup levels in ground water in the primary aquifer adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area). Alternative 5 will treat ground water extracted from the shallow

and primary aquifers adjacent to the landfill and rely on treatment/containment components of the remedy to decrease ground water contamination and achieve cleanup levels in the primary aquifer south of the river (Eldorado Plat area). Alternative 6 will treat ground water extracted from the primary aquifer south of the river (Eldorado Plat area) and rely on treatment/containment components of the remedy to decrease ground water contamination and achieve cleanup levels in the shallow and primary aquifers adjacent to the landfill. Alternative 7 will treat ground water extracted from the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area) to achieve ground water cleanup levels.

State of Ohio: Table 23 identifies the State of Ohio chemical-specific ARARs. Surface water standards will be met by Alternatives 3, 4, 5, 6, and 7 by consolidation of contaminated soils under the landfill cap (Alternatives 3 and 4) or treatment and consolidation of contaminated soils under the landfill cap (Alternatives 5, 6, and 7), thereby reducing the potential of migration of contaminated soils into surface water.

#### Location-Specific ARARs

Table 24 identifies the State of Ohio location-specific ARARs. Federal location-specific ARARs are discussed in Section X. All alternatives, except Alternative 1, will meet location-specific ARARs. Location-specific ARARs include RCRA requirements for a site in a 100-year floodplain, minimizing adverse impacts on a wetland, and minimizing potential harm to and restoration of the floodplain.

#### Action-Specific ARARs

Federal action-specific ARARs are discussed in Section X. State of Ohio action-specific ARARs are identified on Table 25. All the Alternatives will comply with the Federal and State of Ohio (Ohio Revised Code (ORC) and Ohio Administrative Code (OAC)) action-specific ARARs. These ARARs include: Clean Water Act, OAC, and ORC requirements for discharge of effluent to a river; Clean Air Act, OAC, and ORC requirements for excavation of soils on-site and gas collection and treatment; ORC and OAC requirements for leachate removal and treatment; and ORC and OAC requirements for ground water monitoring.

## PRIMARY BALANCING CRITERIA:

### 3. Long-term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedial action to maintain reliable protection of human health and the environment over time, once cleanup levels have been met.

Alternative 1 does not reduce risks and will not provide long-term effectiveness or permanence.

Alternatives 3, 4, 5, 6, and 7 provide long-term effectiveness and permanence by utilizing source controls (landfill cap, consolidation of soils under landfill cap, landfill gas collection and treatment, leachate extraction and treatment) which will result in a minimal residual risk. The landfill cap is considered to be an effective long-term technology to reduce migration from the landfill, however long-term maintenance will be required. Alternatives 5, 6, and 7 provide a more permanent soils remedial action by treating soils prior to placement under the landfill cap.

Alternatives 3, 4, 5, and 6 rely, to a certain degree, on treatment/containment components of the alternatives to decrease ground water contamination and achieve cleanup levels in ground water. Long term ground water monitoring will be required for alternatives 3, 4, 5, and 6 to: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site. Long-term ground water monitoring will be required for alternative 7 to monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

### 4. Reduction of Toxicity, Mobility, or Volume Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to an assessment of the degree to which a remedial action utilizes treatment to address the principal threats to human health and the environment at the Site. Details of the treatment systems will be identified during the remedial design.

Alternative 1 provides no treatment and therefore no reduction in contaminant toxicity, mobility, or volume (TMV).

#### Landfill Gases

Alternatives 3, 4, 5, 6, and 7 reduce toxicity, mobility, and volume of contamination in landfill gases through treatment.

### Leachate

Alternatives 3, 4, 5, 6, and 7 reduce toxicity, mobility, and volume of leachate contamination through treatment.

### Soils

Alternatives 5, 6 and 7 reduce mobility, but not toxicity or volume, of soil contaminants through treatment prior to consolidation.

### Ground Water

Alternative 3 does not utilize treatment to reduce TMV of ground water contamination. Alternatives 4, 5, 6, and 7 reduce TMV of ground water contamination through treatment, but each alternative treats different areas of ground water contamination (shallow and primary aquifers adjacent to the landfill and primary aquifer south of the river (Eldorado Plat area)).

Alternative 4 utilizes treatment to reduce TMV of ground water contamination in the shallow aquifer adjacent to the landfill.

Alternative 5 utilizes treatment to reduce TMV of ground water contamination in the shallow and primary aquifers adjacent to the landfill. Both Alternatives 4 and 5 will reduce TMV of ground water contamination in the primary aquifer south of the river (Eldorado Plat area). Alternative 6 utilizes treatment to reduce TMV of ground water contamination in the primary aquifer south of the river (Eldorado Plat area). Alternative 7 utilizes treatment to reduce TMV of ground water in the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area).

## 5. Short-Term Effectiveness

Addresses the potential adverse effects that implementation of a remedial action may have on human health and the environment, i.e., effects to the community, workers and environment during construction and before cleanup levels are achieved. Time until protection is achieved is also evaluated.

Alternative 1 (the No Action Alternative) poses no potential adverse short-term effects to on-site workers. Alternatives 3, 4, 5, 6, and 7 may pose risks to workers installing landfill gas extraction wells and flares, workers excavating and consolidating contaminated soils, and workers installing the landfill cap. These risks will be negligible once gas extraction wells are installed and operating, contaminated soils are excavated and consolidated, and the cap is installed. Risks may be posed to workers involved with installing institutional controls, flood protection, and storm water controls. Workers involved with routine ground water monitoring may be exposed to contaminated ground water until cleanup levels are reached. Alternatives 5, 6 and 7 may pose risks to workers treating contaminated soils prior to their placement under the landfill cap. Alternatives 3, 4, 5, 6, and 7 may pose risks to workers through direct contact with



leachate/ground water while installing leachate extraction wells, ground water extraction wells, and leachate and ground water treatment systems.

These potential adverse effects will be controlled by implementation of engineering controls, through the use of personal protective equipment, and by the implementation of a health and safety plan during construction.

Installation of the landfill gas wells may pose risks to the community. Risks will be minimized by installing the wells during suitable weather conditions.

Alternatives 6 and 7 may pose short-term risks to the residents of Eldorado Plat due to dust and noise generated during drilling and pipeline construction of the off-site ground water extraction well system.

Alternative 1, the No Action Alternative, has no timeframe to achieve protection. Alternatives 3, 4 and 5 should attain cleanup levels in approximately 6 years. Alternatives 6 and 7 should attain cleanup levels in approximately 8 years.

## 6. Implementability

Implementability addresses the technical and administrative feasibility of a remedial action, including the availability of services and materials.

All alternatives are expected to be technically feasible and administratively implementable. Alternatives 5, 6 and 7 are implementable; however, the soil treatment component to be implemented prior to consolidation under the landfill cap, common to these alternatives, is more complex to administer.

The leachate extraction and treatment system component of Alternatives 3, 4, 5, 6, and 7 is implementable. Alternatives 4, 5, 6 and 7 are more difficult to implement than Alternative 3 due to the installation and operation of the on-site ground water extraction and treatment system. Alternatives 6 and 7 are the most complex alternatives due to the construction of a pipeline crossing the river to transport ground water extracted from the primary aquifer south of the river (Eldorado Plat area), north to the on-site treatment system.

## 7. Cost

Cost includes estimated capital and operation and maintenance costs for a remedial action, and also is expressed as net present worth cost.

Alternative 1

No Cost

Alternative 3

Estimated Capital Cost:	\$11,463,000
Estimated Annual O&M Costs:	\$ 398,000
Estimated Present-Worth Costs:	\$16,820,000
Estimated Implementation Timeframe:	6 years

Alternative 4

Estimated Capital Cost:	\$12,911,000
Estimated Annual O&M Costs:	\$ 544,000
Estimated Present-Worth Costs:	\$20,510,000
Estimated Implementation Timeframe:	6 years

Alternative 5

Estimated Capital Cost:	\$13,884,000
Estimated Annual O&M Costs:	\$ 618,000
Estimated Present-Worth Costs:	\$22,620,000
Estimated Implementation Timeframe:	6 years

Alternative 6

Estimated Capital Cost:	\$12,600,000
Estimated Annual O&M Costs:	\$ 519,000
Estimated Present-Worth Costs:	\$19,810,000
Estimated Implementation Timeframe:	8 years

Alternative 7

Estimated Capital Cost:	\$14,341,000
Estimated Annual O&M Costs:	\$ 617,000
Estimated Present-Worth Costs:	\$23,060,000
Estimated Implementation Timeframe:	8 years

Alternative 1 does not entail any cost at the present time, but may result in the need for costly remediation in the future. Alternative 7 is estimated to be the most expensive alternative, followed by (from most to least expensive) Alternatives 5, 4, 6, and 3.

## MODIFYING CRITERIA:

### 8. State Acceptance

State acceptance indicates whether, based on its review of the RI/FS and Proposed Plan, the State of Ohio concurs, opposes, or has no comment on the selected remedial action.

The State of Ohio concurs with the selected remedial action.

### 9. Community Acceptance

Community acceptance addresses the community's acceptance of the preferred alternative presented in the Proposed Plan based on comments received during the public comment period. The Responsiveness Summary, attached to this ROD, contains significant comments received during the public comment period and the Agencies' response to those comments.

## IX. SELECTED REMEDIAL ACTION

The U.S. EPA has selected Alternative 4 for the final remediation of the Powell Road Landfill Superfund Site.

Alternative 4 includes:

- institutional controls
- improved landfill cap with liner
- excavation of contaminated soils
- consolidation of contaminated soils under landfill cap
- ground water monitoring
- flood protection
- storm water controls
- active landfill gas collection with flare
- leachate extraction
- on-site leachate treatment
- extraction of ground water from the shallow aquifer adjacent to the landfill
- on-site ground water treatment
- discharge of treated ground water and leachate to river

Estimated Capital Cost:	\$12,911,000
Estimated Annual O&M Costs:	\$ 544,000
Estimated Present-Worth Costs:	\$20,510,000
Estimated Implementation Timeframe:	6 years

Contaminated soils will be consolidated on the landfill and a landfill cap with liner will contain the landfill and contaminated soils. The landfill cap will prevent migration of contaminated soils into surface water, reduce infiltration of precipitation into the landfill thereby reducing generation of

leachate and also reducing the percolation of leachate from the landfill into ground water. Leachate will be extracted from the landfill and treated on-site. Ground water will be extracted from the shallow aquifer adjacent to the landfill and treated on-site.

The selected remedy will address the two source areas for ground water contamination at the Site; leachate in the landfill and ground water in the shallow aquifer adjacent to the landfill. The geology of the Site indicates that contamination in the shallow aquifer adjacent to the landfill could migrate under the Great Miami River and this aquifer is a possible source of contamination identified in the primary aquifer adjacent to the landfill and south of the river (Eldorado Plat area). Adjacent to the landfill, the shallow aquifer is separated from the primary aquifer under the southern portion of the landfill and under the river, therefore, leachate in the landfill and ground water contamination in the shallow aquifer adjacent to the landfill are the probable sources of ground water contamination identified in the primary aquifer adjacent to the landfill and south of the river (Eldorado Plat area). The selected remedy will not actively remediate ground water contamination identified in the primary aquifer adjacent to the landfill or ground water contamination identified south of the river (Eldorado Plat area). By extracting and treating leachate from the landfill and ground water from the shallow aquifer, the source of ground water contamination identified in the primary aquifer (adjacent to the landfill and south of the river (Eldorado Plat area) will be reduce and ground water contamination is expected to decrease and cleanup levels will be achieved. Ground water contamination should decrease and achieve cleanup levels in an estimated 6 years.

Ground water monitoring is an essential part of this remedy. A ground water monitoring network will be established on the Site (around the landfill and south of the river (Eldorado Plat area)). Ground water monitoring will serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site. If ground water monitoring identifies that ground water contamination is not decreasing and cleanup levels are not being achieved, the remedy will be reevaluated. The remedial design will develop the specific details of the ground water monitoring network, including the number and location of wells necessary to monitor ground water. The specifics of the ground water monitoring system, including frequency and duration, will be determined during the remedial design.

Off-site ground water contamination identified in the Needmore Road area during the RI, could not be connected to contamination found on the Site. However, if in the future a connection is found which identifies PRL as the source of contamination in the Needmore Road area, either a ROD amendment or an Explanation of Significant Differences will be prepared, as appropriate.

The remedial design will identify the appropriate number and location of wells to collect/extract landfill gas, leachate, and ground water.

Cleanup levels to be achieved by the selected remedial action will be chemical-specific ARARs (see Section X.B.1.). If multiple contaminants are present in the media (i.e. ground water), and cleanup of individual contaminants to ARARs result in a cumulative risk in excess of  $10^{-4}$  across a media, cleanup levels of contaminants will be risk-based and cumulative across a media to  $1 \times 10^{-4}$  or less (Table 21). If chemical-specific ARARs do not exist for contaminants, cleanup levels of contaminants will be risk-based and cumulative across a media to  $1 \times 10^{-4}$  or less (Table 21). The point of compliance for ground water cleanup levels will be the boundary of the landfill. Ground water cleanup levels shall be achieved at and beyond the landfill. The point of compliance for cleanup levels of landfill gas emissions shall be the fence surrounding the landfill area.

The selected remedial action is expected to be the final response for the Site. Because this remedial action will result in hazardous substances remaining on-site, a review will be conducted within five years after commencement of remedial action to insure that the remedial action continues to provide adequate protection of human health and the environment.

## **X. STATUTORY DETERMINATIONS**

The U.S. EPA believes that Alternative 4 meets the threshold criteria and provides the best protection with respect to the criteria used to evaluate the alternatives (National Contingency Plan 40 CFR Part 300.430(f)(5)(ii)(A-F)).

### **A. Protection of Human Health and the Environment**

Alternative 4 utilizes institutional controls to reduce risks posed to trespassers by fencing the Site and posting warning signs, and reduces the risks posed to potential future users of the Site by imposing deed restrictions on the landfill property.

Numerous source controls are utilized by Alternative 4: landfill cap; landfill gas collection and treatment; leachate extraction and treatment; and excavation and consolidation of contaminated soils under the landfill cap. The risks posed by inhalation of

landfill gases are reduced by collecting and treating landfill gases.

The interaction of several components of Alternative 4 will decrease ground water contamination and achieve cleanup levels. The landfill cap will reduce infiltration of precipitation into the landfill, thereby reducing generation of leachate, and also reducing the percolation of leachate from the landfill into ground water. Extraction and treatment of leachate from the landfill and ground water from the shallow aquifer adjacent to the landfill will address the primary sources of ground water contamination and risks posed by ground water contamination in the shallow aquifer (adjacent to the landfill). Leachate and ground water in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer adjacent to the landfill and south of the river (Eldorado Plat area). Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, a minimum of 6 years will be required to decrease ground water contamination and achieve ground water cleanup levels in the shallow and primary aquifers adjacent to the landfill and in the primary aquifer south of the river (Eldorado Plat area).

The risks posed by ingestion of fish are based on the potential migration of contaminated soils into surface water and sediment. These risks will be controlled and reduced by excavating and consolidating contaminated soils under the landfill cap.

Cleanup levels to be achieved by the selected remedial action will be chemical-specific ARARs (Table 22). If multiple contaminants are present in the media (i.e. ground water), and cleanup of individual contaminants to ARARs result in a cumulative risk in excess of  $10^{-4}$  across a media, cleanup levels of contaminants will be risk-based and cumulative across a media to  $1 \times 10^{-4}$  or less (Table 21). If chemical-specific ARARs do not exist for contaminants, cleanup levels of contaminants will be risk-based and cumulative across a media to  $1 \times 10^{-4}$  or less (Table 21).

Potential adverse short-term risks posed to on-site workers will be controlled by implementation of engineering controls. No cross-media impacts will be caused by implementation of Alternative 4.

#### B. Compliance with ARARs

Alternative 4 will meet or attain all applicable or relevant and appropriate Federal or State requirements (ARARs) and will be implemented in a manner consistent with those laws. It is important to note that on-site actions are required to comply with ARARs, but must comply only with the substantive parts of

the applicable or relevant and appropriate requirement. Off-site actions must comply only with applicable requirements, but must comply fully with both substantive and administrative requirements. For example, at the Powell Road Landfill Site, the discharge to the Great Miami River of extracted ground water and extracted leachate which has been treated will be an off-site discharge, and will therefore be subject to both the substantive and administrative requirements of Federal and State law promulgated pursuant to the Clean Water Act National Pollutant Discharge Elimination System. The chemical-specific, location-specific and action-specific ARARs for the selected remedial action for the PRL are identified below.

#### 1. Chemical-Specific ARARs

Chemical specific ARARs regulate the release to the environment of specific substances having certain chemical characteristics. Chemical-specific ARARs typically determine the extent of clean-up at a Site. For the PRL site, these are:

##### a. Federal Chemical-Specific ARARs

Safe Drinking Water Act MCLs and MCLGs - Maximum Contaminant Levels (MCLs) and, to a certain extent, non-zero Maximum Contaminant Level Goals (MCLGs), the Federal Drinking Water Standards promulgated under the Safe Drinking Water Act (SDWA) are applicable to municipal drinking water supplies servicing 25 or more people. MCLGs are relevant and appropriate when the standard is set at a level greater than zero (for non-carcinogens); otherwise, MCLs are relevant and appropriate. At the Powell Road Landfill (PRL) site, MCLs and MCLGs are not applicable, but are relevant and appropriate since the aquifer in which the PRL site is located is a sole-source aquifer for drinking water for the City of Dayton. The point of compliance for the Federal drinking water standards is at the boundary of the landfilled waste and throughout the contaminated ground water plume associated with the PRL site.

Clean Air Act (40 CFR Part 50) - The Clean Air Act requirements include the TSP standard for air discharges. This requirement is applicable to the PRL site because the gas extraction and treatment, leachate treatment, excavation and consolidation of contaminated soils, and various other treatment methods which are part of this remedy are potential sources of fugitive dust, particulate, and/or VOCs.

See Table 22 for a list of additional Federal chemical-specific ARARs.

##### b. State Chemical-Specific ARARs

See Table 23 for a list of the State of Ohio Chemical-Specific

## ARARs

### 2. Location-Specific ARARs

Location-specific ARARs are those requirements that relate to the geographic position of the Site. For the PRL site, these are:

#### a. Federal Location-Specific ARARs

The Clean Water Act Section 404 - This section of the Act regulates the discharge of dredge and fill materials at sites to waters of the United States. These regulations are applicable to the PRL site, since there are wetlands located on the site.

Wetland Management Executive Order 11990 - This order requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands. This requirement is applicable to the PRL site since there are wetlands located on the Site.

RCRA location standards 40 CFR Part 264.18 - These standards specify that a facility located in a flood plain must be designed, constructed, operated, and maintained to prevent washout of hazardous wastes by a 100-year flood plain. This requirement is applicable to the PRL site if a hazardous waste management unit is created on-site as a result of air stripping or other on-site treatment, these standards are applicable to the PRL because the site is located in a 100-year flood plain.

Floodplain Management Executive Order 11988 - This order requires minimization of potential harm to or within flood plains and the avoidance of long- and short-term adverse impacts associated with the occupancy and modification of flood plains. This order is applicable to the PRL site since the PRL site is located within a flood plain.

#### b. State Location-Specific ARARs

See Table 24 for a list of the State of Ohio location-specific ARARs.

### 3. Action-Specific ARARs

Action-Specific ARARs are requirements that define acceptable treatment and disposal procedures for hazardous substances. For the PRL site, these are:

#### a. Federal Action-Specific ARARs

RCRA Subtitle C Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities (40 CFR Part 264)



- These requirements govern the owners and operators of hazardous waste treatment storage and disposal facilities. These requirements are applicable to the PRL site if a hazardous waste management unit is created on-site as a result of air stripping or other on-site treatment methods.

Clean Air Act Standards for the Approval and Promulgation of Implementation Plans (40 CFR Part 52) - These requirements govern the approval and promulgation of implementation plans. These requirements are applicable to the PRL site because of various aspects of the remedy for the PRL site including excavation and consolidation of contaminated soils, gas collection and treatment, and the use of several treatments methods at the site.

Toxic Substances Control Act Standards for Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce and Use Prohibitions (40 CFR Part 761) - These requirements govern the manufacturing, processing, distribution in commerce and use prohibitions for polychlorinated biphenyls (PCBs). These requirements will be applicable to the PRL site if additional testing is done of the contaminated soils to be excavated and consolidated as part of the PRL site remedy is done, and the soils are found to exceed a PCB level of 50 parts per million.

Clean Air Act Air Quality and Emission Limitations (Clean Air Act Section 110). These requirements relate to air quality and emission limitations. These requirements are applicable to the PRL site due to various aspects of the remedy for the PRL site including excavation and consolidation of contaminated soils, gas collection and treatment, and the use of several treatment methods at the Site.

b. State Action-Specific ARARs

See Table 25 for a list of the State of Ohio action-specific ARARs.

4. To Be Considered

a. Federal to be Considered

"Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites" (June 15, 1989) (OSWER Directive 9355.0-28) - This guidance indicates that sources that need controls are those with actual emissions rates in excess of 3 lbs/hr, or 15 lbs/day, or a calculated rate of 10 tons/year (T/yr) of total VOCs. This guidance should be considered at the PRL site if one of the treatment methods used as part of the remedy for the PRL site is a ground-water-pump-and-treat technique used together with air strippers, and if the emission rates at the PRL exceed these rates, and since the PRL is located

in an ozone non-attainment area.

### C. Cost-Effectiveness

The U.S. EPA believes that the selected remedial action is cost-effective in mitigating the risks posed by the Site contaminants within a reasonable period of time. Section 300.430(f)(ii)(D) of the NCP requires EPA to evaluate cost-effectiveness by comparing all the alternatives which meet the threshold criteria of protection of human health and the environment against three additional balancing criteria: long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; and short-term effectiveness. The selected remedial action meets these three criteria and provides overall effectiveness in proportion to its cost. The estimated cost for the selected remedial action is \$20.5 million, which is a reasonable value for the expected results to be achieved by the selected remedial action.

### D. Utilization of permanent solutions and alternate treatment technologies to the maximum extent practicable

U.S. EPA believes that the selected remedial action represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner to address contamination and risks associated with the Site and potential migration of contaminants away from the Powell Road Landfill. The selected remedial action provides the best balance of tradeoffs in terms of long-term effectiveness or permanence; reduction in toxicity, mobility or volume; short-term effectiveness; implementability; cost; and State and community acceptance.

The criterion of overall protection of human health and the environment and long-term effectiveness and permanence were crucial in the decision to select Alternative 4. Overall protection of human health and the environment was best achieved by the selected remedial action because it provides protection of human health from risks through treatment of leachate and ground water in the shallow aquifer adjacent to the landfill. By treating contamination in leachate and ground water in the shallow aquifer adjacent to the landfill, ground water contamination will decrease, cleanup levels will be achieved, and the continued migration of leachate and contaminated ground water from the shallow aquifer adjacent to the landfill is reduced. Leachate and ground water contamination in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer, adjacent to the landfill and south of the river (Eldorado Plat area). Extraction and treatment of leachate from the landfill and ground water from the shallow aquifer adjacent to the landfill will address these

sources of ground water contamination and associated risks. Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, contamination in the primary aquifer adjacent to the landfill and south of the river, will decrease and achieve cleanup levels.

Long-term effectiveness and permanence was best achieved by the selected remedial action due to leachate and ground water treatment components. Leachate in the landfill and ground water in the shallow aquifer adjacent to the landfill will be extracted and treated to reach cleanup levels and reduce residual risks in ground water. The ground water in the shallow aquifer adjacent to the landfill has the highest ground water risks, and during the breakdown and dispersion of ground water contamination, risks to downgradient well users could exist. Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, the source of ground water contamination in the primary aquifer south of the river (Eldorado Plat area) will no longer exist and ground water contamination in the primary aquifer (adjacent to the landfill and south of the river (Eldorado Plat area)) will reduce and achieve cleanup levels (estimated to occur in a minimum of 6 years).

Alternative 7 is the only alternative that actively addresses all areas of ground water contamination associated with the landfill and reduces risks posed by ground water contamination. Ground water contamination in the primary aquifer south of the river (Eldorado Plat area) is addressed in Alternative 7 by extracting ground water from the primary aquifer south of the river (Eldorado Plat area), transporting the extracted ground water across the river via a pipe, to the Site for on-site treatment. This ground water technology was considered too expensive and too complex to implement compared to the minimal reduction of ground water risks.

The State of Ohio concurs with the selected remedial action. The community's comments received during the public comment period are summarized in the Responsiveness Summary, attached to this ROD, along with the Agencies' response to comments.

The selected remedial action meets the statutory requirement to utilize permanent solutions and treatment technologies, to the maximum extent practicable.

#### E. Preference for Treatment

The selected remedial action satisfies the statutory preference for treatment as a principal element. Landfill gases and leachate will be collected/extracted and treated on-site. Ground water will be extracted from the shallow aquifer adjacent to the landfill and treated on-site. Leachate will be extracted from

the landfill and treated on-site. The Powell Road Landfill, the source of contamination, will not be treated, but will be contained by a landfill cap.

## **XI. DOCUMENTATION OF SIGNIFICANT CHANGES**

The preferred alternative presented in the Proposed Plan was Alternative 5. The Record of Decision identifies the selected remedial action as Alternative 4. Because the selected remedial action was one of the alternatives presented in the Proposed Plan, the U.S. EPA was not required to seek additional public comment on a revised Proposed Plan (NCP 40 CFR Part 300.430(F)(3)(ii)(A)). The differences between these two alternatives are the following: 1) Alternative 4 does not include treatment of contaminated soils to dewater, stabilize and solidify the soils (prior to consolidation under the landfill cap), and 2) Alternative 4 does not include extraction of ground water from the primary aquifer adjacent to the landfill.

The preferred alternative presented in the Proposed Plan was modified as a result of comments received during the public comment period. Public comments caused the U.S. EPA and Ohio EPA (the Agencies) to reevaluate the preferred alternative. Several major comments were received during the public comment period which questioned various aspects of the leachate and ground water extraction and treatment components of the preferred alternative. Based on these comments the Agencies consulted technical experts for assistance with the issues. Below is a summary of the comments, followed by the actions the Agencies took to resolve the issues.

### **Comment 1.**

A ground water extraction system could compromise the leachate extraction system, and pull contamination from the leachate/ground water adjacent to the landfill, deeper into the primary aquifer.

### **Action:**

PRL documents were reviewed by the Agencies' technical staff and calculations of estimated drawdown of the ground water table which could be caused by a ground water extraction system were calculated. These calculations estimate conditions under which ground water extraction could have a negative effect on a leachate extraction system.

Drawdown calculations of a ground water extraction system in the shallow aquifer adjacent to the landfill identified minimal drawdown of the water table would occur (<1 foot). Since ground water extraction wells will be located between the southern boundary of the landfill and the river, any possible effects of ground water extraction would influence only the leachate

extraction wells closest to the southern boundary of the landfill. Pumping rates of both extraction systems could be adjusted as necessary to prevent any negative interaction of the two extraction systems.

Drawdown calculations of a ground water extraction system in the primary aquifer adjacent to the landfill identified substantial drawdown of the water table may occur (possibly 4 feet). Therefore, extraction of ground water from the primary aquifer adjacent to the landfill could increase downward migration of contamination from the shallow aquifer adjacent to the landfill into the primary aquifer adjacent to the landfill, except where the confining till layer would limit vertical migration.

Therefore, the Agencies partially agree with the commenter. Extracting ground water from the primary aquifer may compromise the leachate extraction system. However, the Agencies believe that it remains necessary to extract and treat ground water from the shallow aquifer adjacent to the landfill to reduce the risks posed by ground water in this aquifer.

Comment 2.

The Proposed Plan's preferred alternative 5 was questioned. The rationale being questioned was that by extracting ground water from the primary aquifer adjacent to the landfill, contamination identified south of the river (Eldorado Plat area), would be reduced. The commenter states that there is no evidence that PRL is the source of contamination found south of the river (Eldorado Plat area).

Action:

This comment caused the Agencies to carefully review the geology of the Site, the ground water contaminants and the migration of ground water away from the Site.

The primary aquifer which underlies the landfill is separated by a confining till layer which is present under the south side of the landfill and under the river. This till layer separates the aquifer into a shallow and primary aquifer. Although the till layer is present south of the river (Eldorado Plat area), it is not continuous and therefore the aquifers are interconnected.

Ground water contamination is found adjacent to the landfill in the shallow aquifer and in the primary aquifer. However, south of the river (Eldorado Plat area), geologic cross-sections do not show a continuous till layer separating the aquifers in the vicinity of the monitoring wells. RI ground water data in the Eldorado Plat area identifies contamination in monitoring wells both above and below the discontinuous till layer.

Ground water sampling and analysis found VOCs in the shallow aquifer adjacent to the landfill (223 ug/L), in the primary

aquifer adjacent to the landfill (150 ug/L), and in the primary aquifer south of the river (Eldorado Plat area) (13 ug/L).

VOC contamination identified in the aquifers adjacent to the landfill tend to primarily consist of "ethane" compounds and VOC contamination identified south of the river (Eldorado Plat area) tend to primarily consist of "ethene" compounds. This is the major argument used in the RI to discount the landfill as the source of ground water contamination identified south of the river (Eldorado Plat area). The Agencies disagree with the argument because "ethene" compounds were found in landfill gas vents (PCE, TCE), leachate (DCE), and in the shallow aquifer adjacent to the landfill (DCE). Ethene compounds were not detected in monitoring wells in the primary aquifer adjacent to the landfill.

Migration of contaminants away from the landfill are based on the location of sources of contamination and the geology. The major source is the landfill, which generates leachate, which migrates into the ground water. Although the till layer does not exist directly under the landfill, ground water flow in the regional aquifer (GMR BVA) is horizontal from the north to south, and once leachate migrates into ground water, it migrates horizontally to the south. This is why the shallow aquifer adjacent to the landfill contained the highest levels of contaminants and exceeded MCLs during RI sampling. Some vertical migration of leachate/ground water also carries contamination into the primary aquifer (adjacent to the landfill), however, only 2 monitoring wells in the primary aquifer adjacent to the landfill showed contamination during RI sampling. Due to these area ground water flow patterns at the Site, migration of contaminants from the landfill to south of the river (Eldorado Plat area), must occur horizontally from either the shallow or primary aquifers adjacent to the Site (or possibly from both aquifers).

RI data suggested that the Great Miami River was a barrier to migration of ground water from adjacent to the landfill, under the river to the aquifer in the Eldorado Plat area. Thus, contamination identified in the Eldorado Plat area must have migrated from the primary aquifer adjacent to the landfill. However, in response to public comments the Agencies consulted ground water experts at Ohio EPA and were advised that the Great Miami River is not necessarily a barrier to ground water contaminant migration under the river.

In conclusion, the Agencies believe that the shallow aquifer adjacent to the landfill is one of the primary sources of contamination found in the Eldorado Plat area. As a primary source, remediation of the shallow aquifer adjacent to the landfill will significantly reduce migration of ground water contamination from the Site. This component of the remedial action, combined with leachate extraction and treatment as well

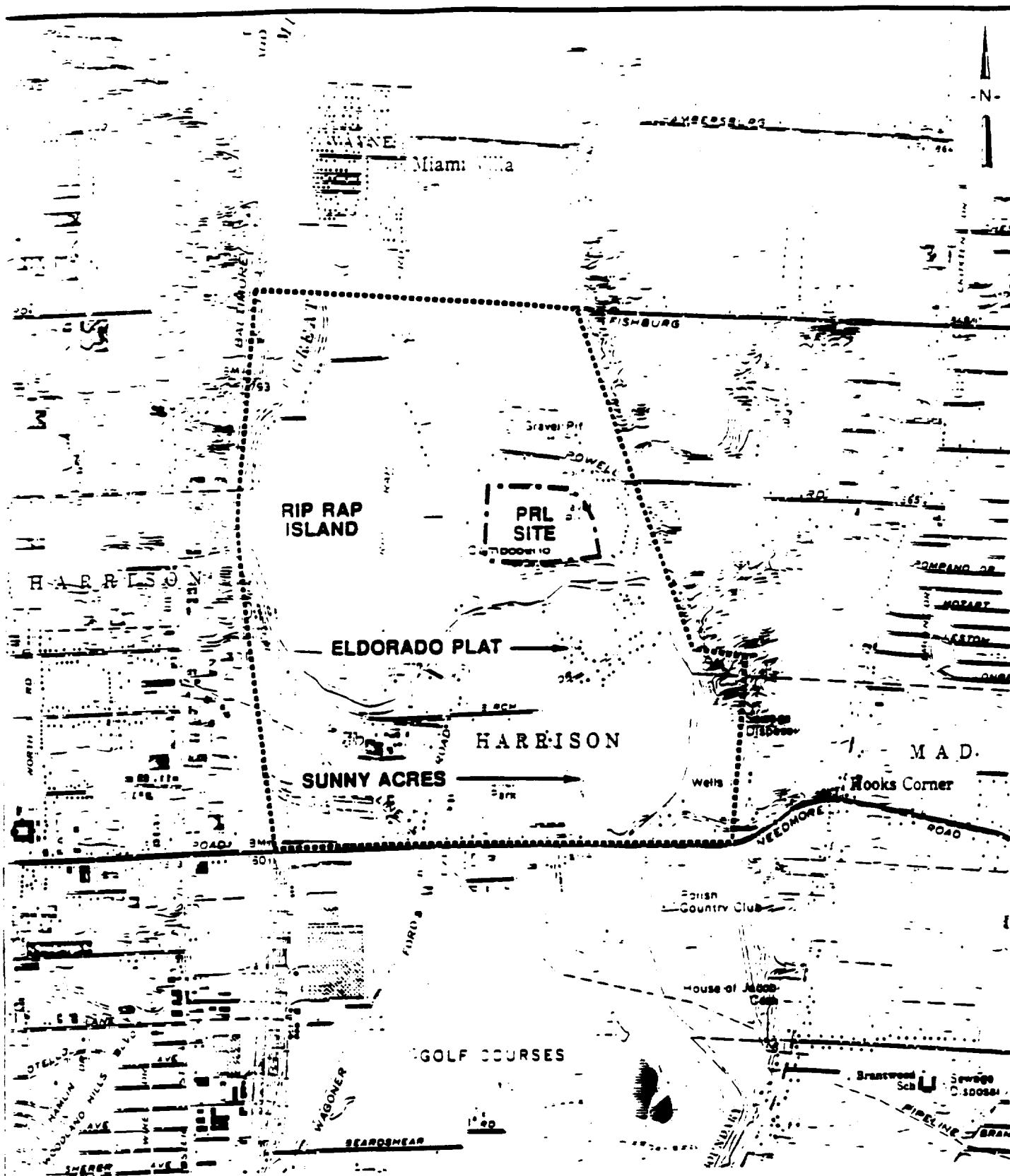
as the construction of the landfill cap, is expected to eliminate migration of ground water contamination from the Site.

Comment 3.

Treatment of excavated contaminated soils, prior to consolidation on the landfill, would not provide additional protection nor provide significant reduction of toxicity, mobility or volume, compared to Alternative 4.

Action:

The Agencies have reviewed the information provided by the commenter, and consulted with the Ohio EPA RCRA program, and agree that treatment of soils to dewater, solidify and stabilize soils prior to consolidation under the landfill cap will not provide any additional protection of human health and the environment, nor provide any significant reduction of toxicity, mobility or volume.



**LEGEND:**

--- SITE BOUNDARY

..... STUDY AREA BOUNDARY

0 2000 4000

SCALE IN FEET



Quadrangle  
Location

BASE MAP SOURCE: USGS 7 1/2 minute topographic quad-  
range map, Dayton North, Ohio 1965, photorevised 1981.

# **POWELL ROAD LANDFILL** SCA SERVICES OF OHIO, INC.

**FIGURE 1**  
**SITE VICINITY MAP**

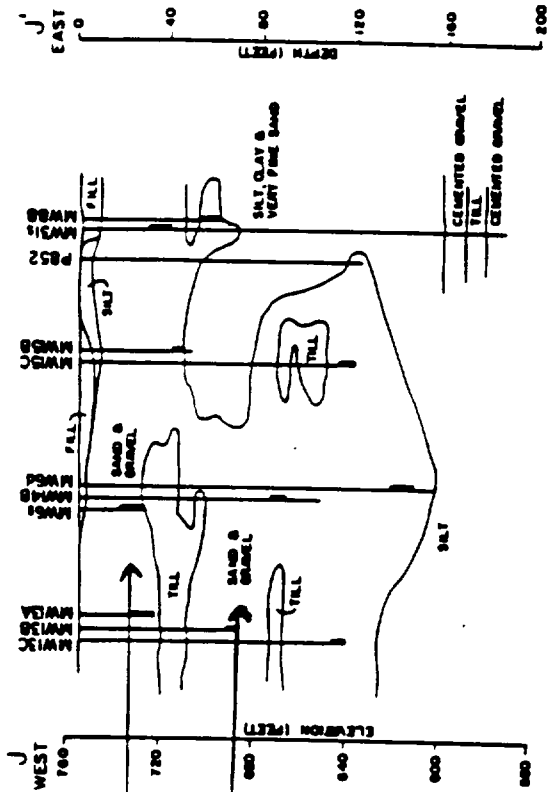
Dames & Moore

JOB NO. 7722-277-017





# Eldorado Plat area (south of river)

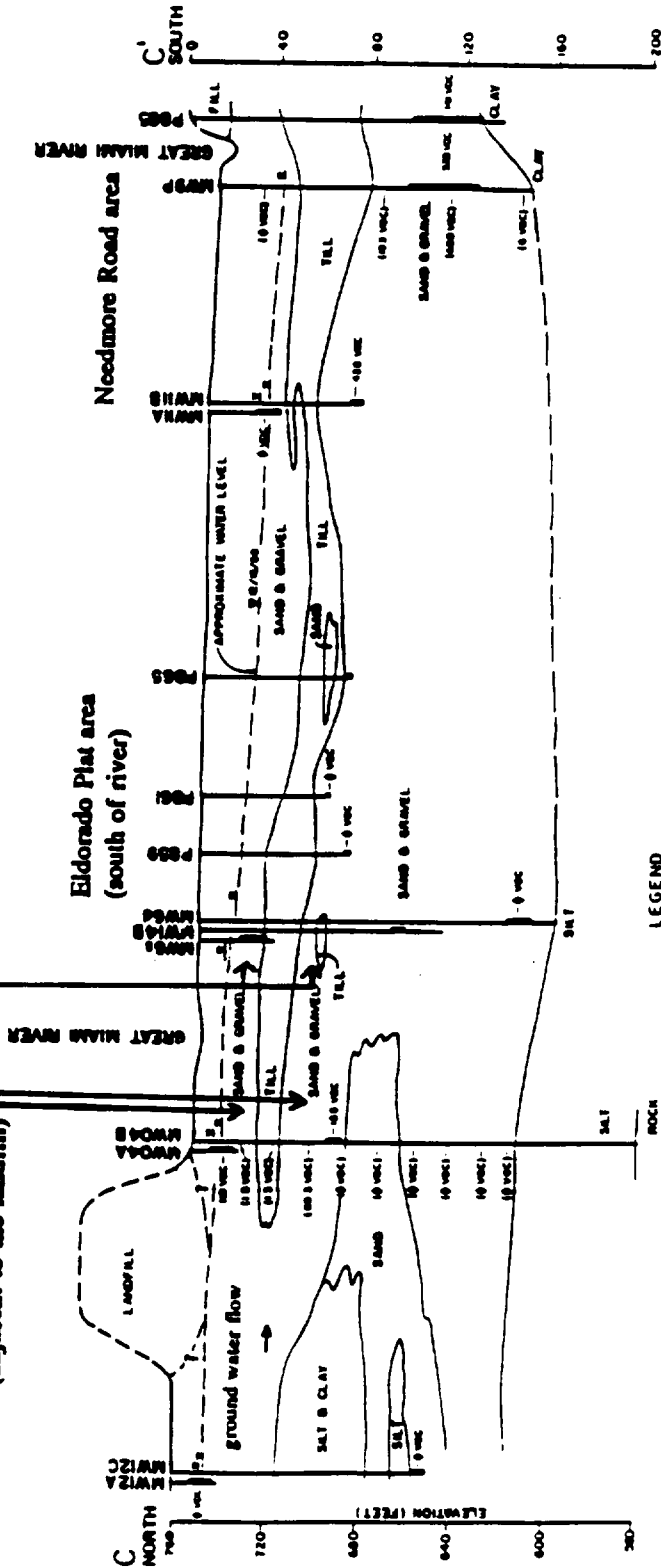


primary aquifer - south of river  
(Eldorado Plat area)

primary aquifer - south of river  
(Eldorado Plat area)

primary aquifer  
(adjacent to the landfill)

shallow aquifer  
(adjacent to the landfill)

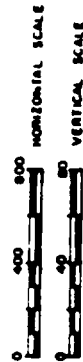


Eldorado Plat area  
(south of river)

Needmore Road area

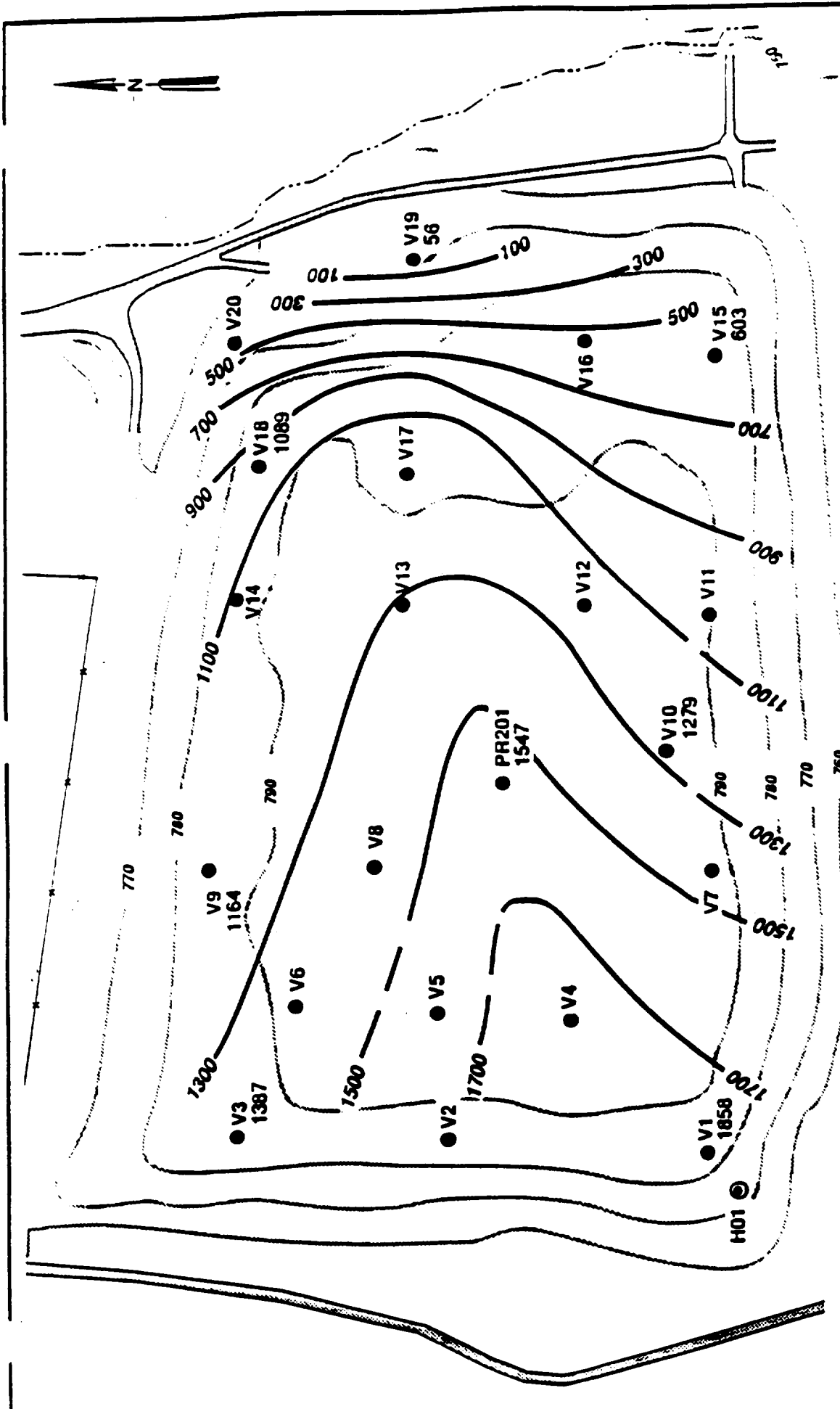
## LEGEND

- WELL SCREEN INTERVAL
- WATER LEVEL 12/18/88
- SAMPLE COLLECTED WHILE DRILLING, VALUES IN #P/1, 0 INDICATES NO DETECTION ANALYSIS FROM 12/18 SAMPLING, VALUES IN #P/1, 0 INDICATES NO DETECTION



HYDROGEOLOGIC CROSS-SECTIONS

FIGURE 3



LEGEND:

- Fence
- - - Intermittent Stream
- 790 - Topographic Contour
- V1 ● Vent Location
- H01 Surface Leachate Sampling Location

1100 — Total VOC concentration Contour, Contour Interval = 200 (dashed where inferred)

1858 Total VOC Concentration (milligrams/cubic meter)

NOTE: All elevations referenced to mean sea level

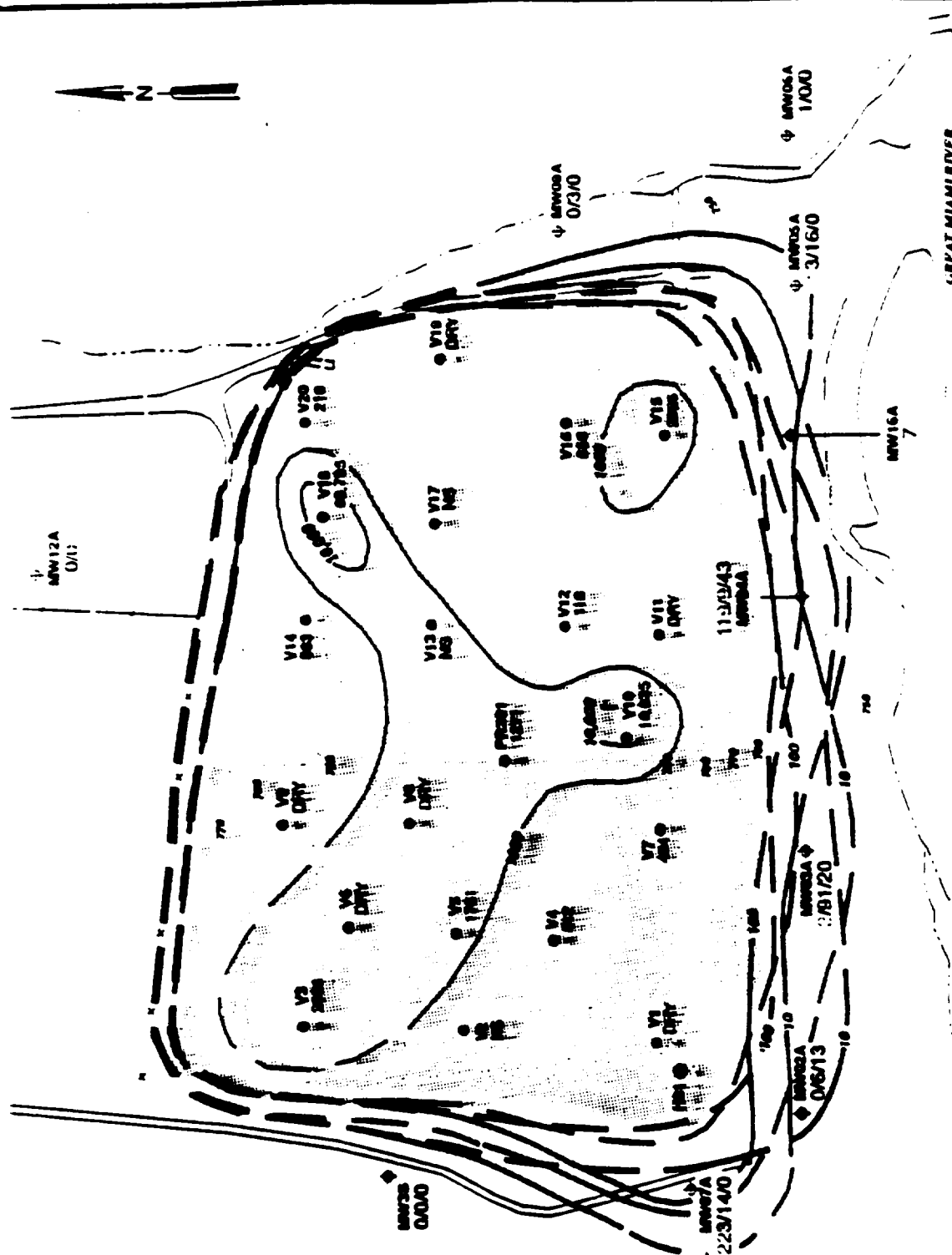
**POWELL ROAD LANDFILL,**  
SCA SERVICES OF OHIO, INC.

FIGURE 4

GAS VENT VAPOR  
TOTAL VOC CONCENTRATIONS

# LEGEND:

- x Fence
- Intermittent Stream
- Topographic Contour
- V8 Vent Location
- ⊙ H01 Surface Leachate Sampling Location
- ⊕ MW07A Shallow Monitoring Well Location
- 404 Vent Liquid Total VOC Concentration (micrograms/liter) October - November 1988
- NS Not Sampled Due to Access Problems
- 1000 Vent Liquid Total VOC Contour, Logarithmic Contour Interval
- 223/140 Ground Water Total VOC Concentration (micrograms/liter) December 1988/ April 1989/February 1991
- 100 Total VOC Contour Reflecting December 1988 Ground Water Data
- 100 Total VOC Contour Reflecting April 1989 Ground Water Data
- 100 Total VOC Contour Reflecting February 1991 Ground Water Data
- Approximate Landfill Area



## POWELL ROAD LANDFILL, SCA SERVICES OF OHIO, INC.

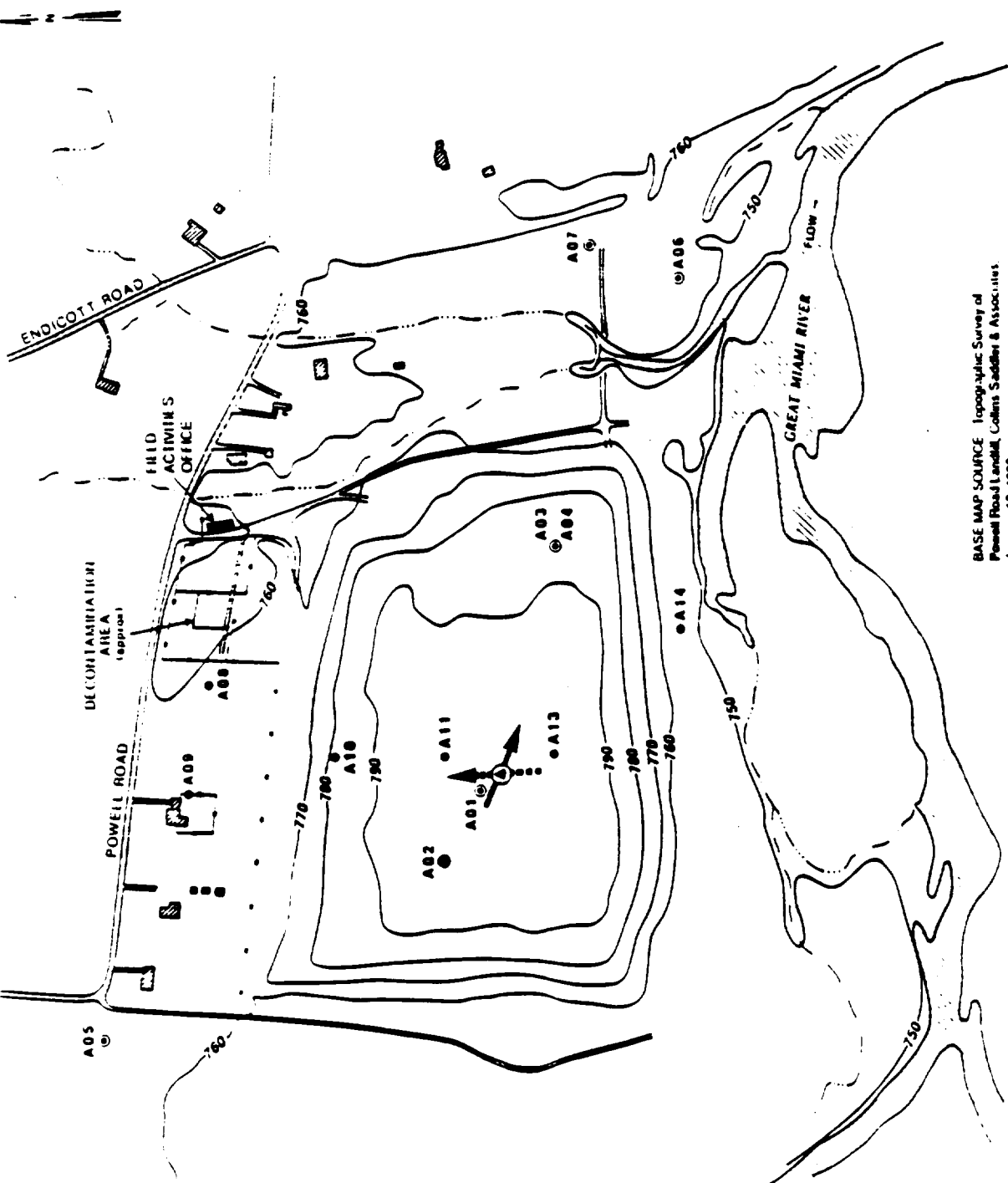
FIGURE 5

LANDFILL LIQUIDS/GROUND WATER  
TOTAL VOC CONCENTRATIONS

NOTE: All elevations referenced to mean sea level.

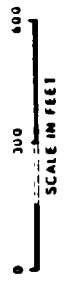
BASE MAP SOURCE: Topographic Survey of Powell Road Landfill, Collins-Sadler & Associates, January 16, 1988.





BASE MAP SOURCE Topographic Survey of  
Powell Road Landfill, Collins Sadtler & Associates,  
January 16, 1988

- LEGEND
- Fence
  - - - Interim Stream
  - / - - Topographic Contour
  - ▲ Meteorological Station (wind speed, wind direction and temperature)
  - Ambient Air Sampling Location (October 26, 1988)
  - Ambient Air Sampling Location (October 27, 1988)
  - ➔ Wind Direction (October 26, 1988)
  - ➔ Wind Direction (October 27, 1988)

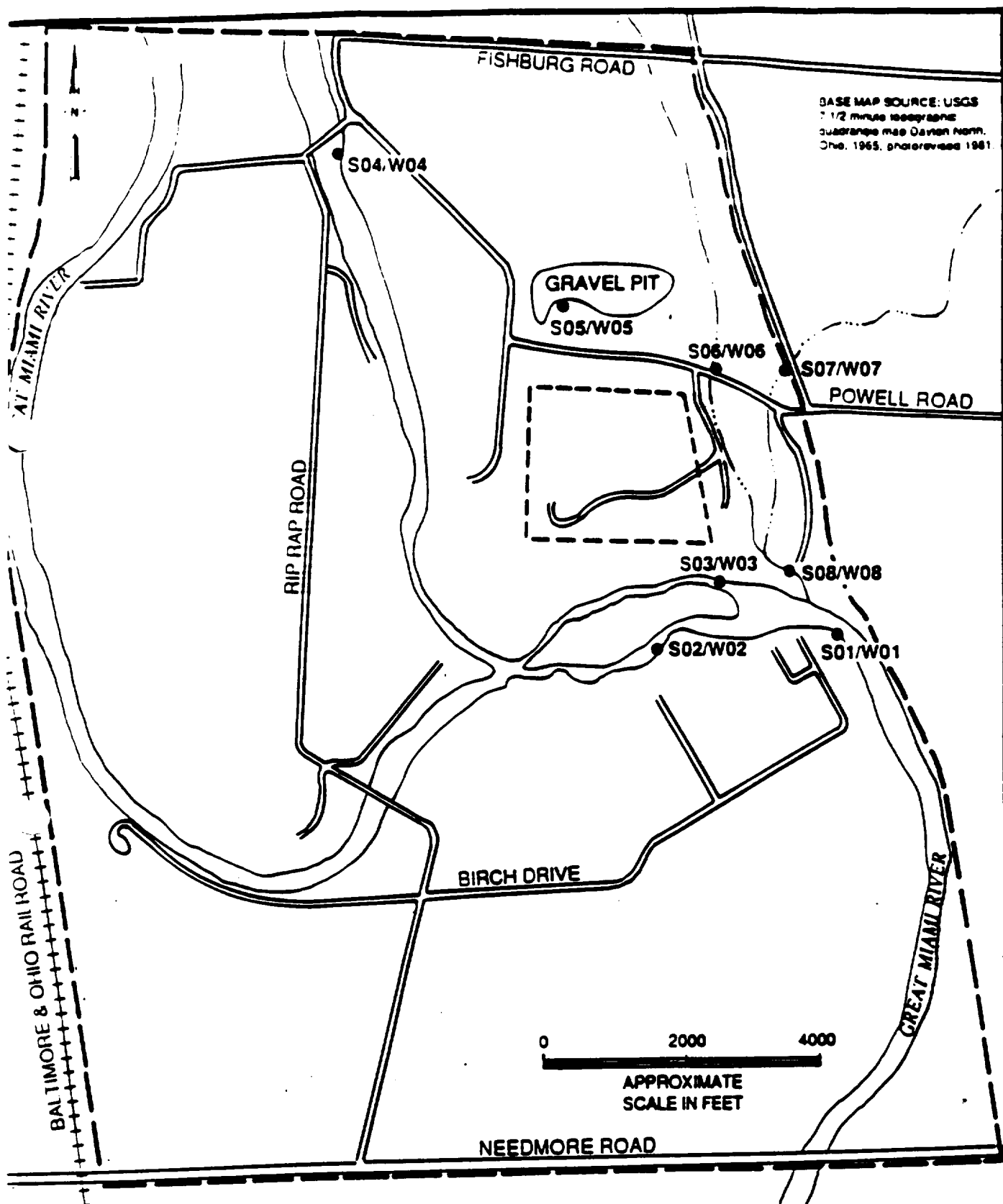


# POWELL ROAD LANDFILL SCA SERVICES OF OHIO, INC.

FIGURE 6

AMBIENT AIR QUALITY  
SAMPLE LOCATIONS

DANES & NUORE KIRK 11/15/12



## POWELL ROAD LANDFILL

SCA SERVICES OF OHIO, INC.

FIGURE 7

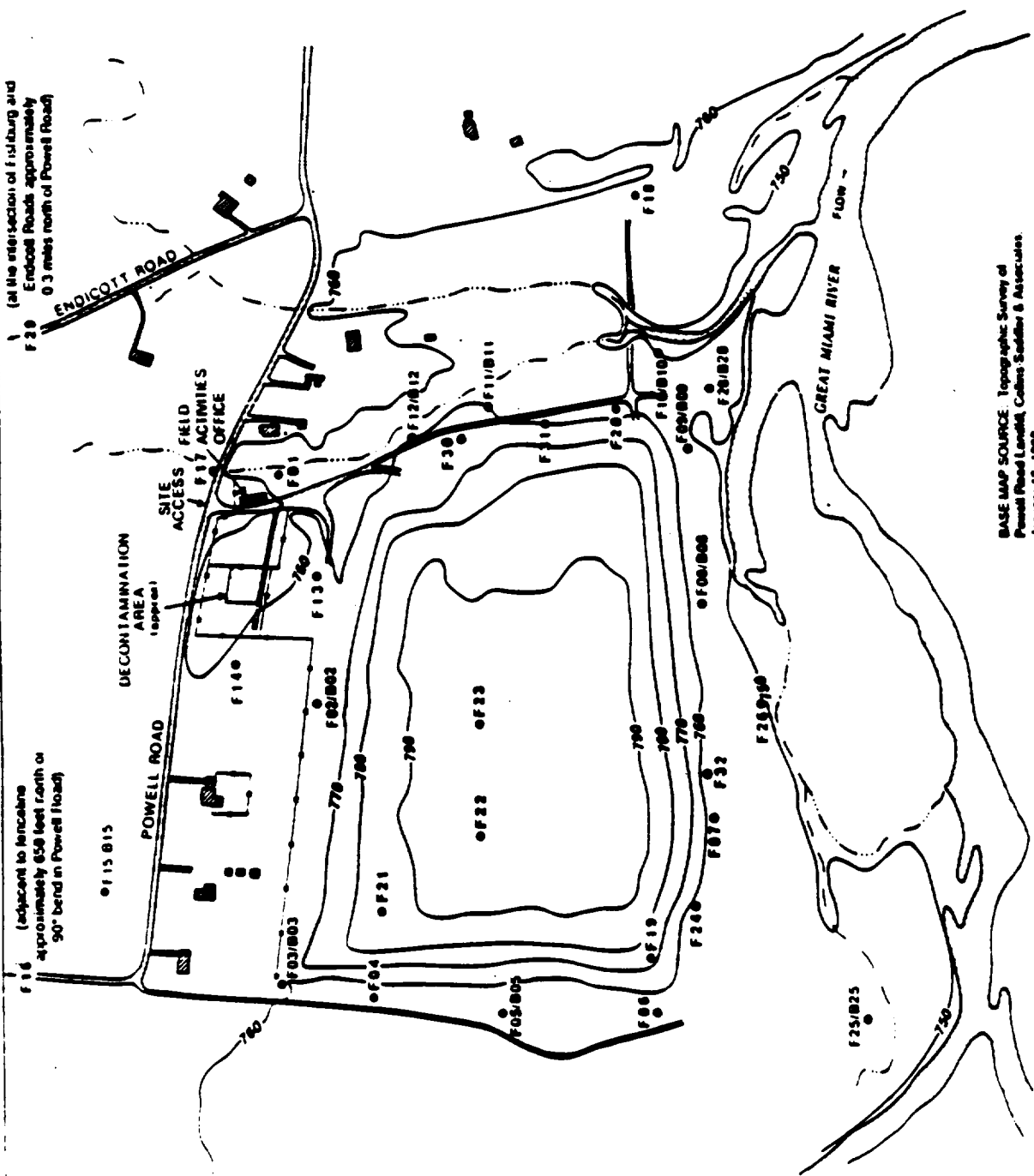
SEDIMENT AND SURFACE WATER  
SAMPLING LOCATIONS

DAMES & MOORE

JOB NO. 772-277-017

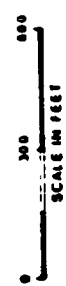
(at the intersection of F15/B15 and  
Endcott Road approximately  
0.3 miles north of Powell Road)

F16 (adjacent to fence line  
approximately 650 feet north of  
90° bend in Powell Road)



BASE MAP SOURCE: Topographic Survey of  
Powell Road Landfill, Collins Suddler & Associates  
January 18, 1988

- LEGEND
- Fence
- Intermittent Stream
- 760 — Topographic Contour
- F01 Surficial Soil Sampling Location
- F15/B15 Surficial and Subsurficial Soil Sampling Location



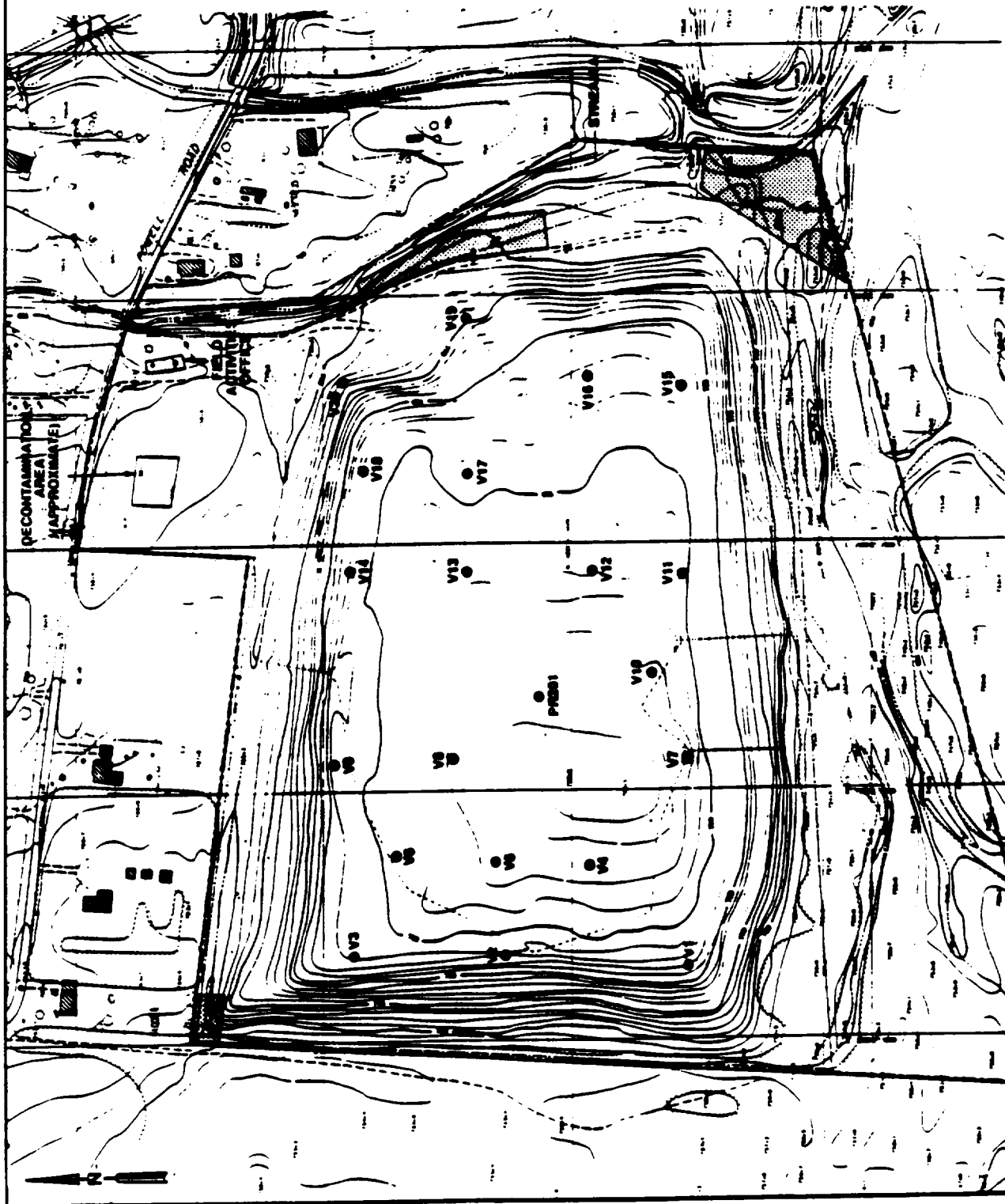
# POWELL ROAD LANDFILL SCA SERVICES OF OHIO, INC.

FIGURE 8

SURFICIAL AND SUBSURFICIAL  
SOIL SAMPLING LOCATIONS

JOB NO. 772-277-017

Daniel A. Moore



LEGEND

- PROPERTY BOUNDARY
- TOPOGRAPHIC CONTOUR (FEET, MSL)
- SPOT ELEVATION (FEET, MSL)
- SITE COORDINATE SYSTEM
- ACCESS ROAD
- TREES / WOODS
- APPROXIMATE LOCATION OF FENCING
- SURFACE WATER DRAINAGE
- INTERMITTENT STREAM
- V2 VENT LOCATION
- ▲ CONTAMINATED SOIL SAMPLE LOCATION
- ESTIMATED HOT SPOT AREA

SCALE IN FEET  
0 200 400

BASE MAP SOURCE: Topographic Survey of Powell Road Landfill RUF Study Area located in sections 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, City of Hudson Heights, Montgomery County, Ohio

POWELL ROAD LANDFILL  
SCA SERVICES OF OHIO INC.

FIGURE 9

SITE PLAN

Revised 8/2000

JOB NO. 1722 277 817





**TABLE 1**  
**GAS VENT METHANE MEASUREMENTS**  
**POWELL ROAD LANDFILL**  
**HUBER HEIGHTS, OHIO**

Vent No.	Date	Percent Methane*
V1	10/25/88	38
V2	10/25/88	60
V3	10/25/88	61
V4	11/08/88	62
V5	11/08/88	61
V6	10/28/88	12
V7	11/08/88	56
V8	11/08/88	58
V9	10/25/88	62
V10	10/28/88	11
V11	11/08/88	59
	11/08/88	58
V12	11/08/88	30
V13	11/08/88	58
V14	10/25/88	61
	10/28/88	19
V15	11/09/88	56
V16	11/09/88	42
V17	11/09/88	46
V18	11/09/88	24
V19	11/09/88	18
	11/09/88	19
V20	11/09/88	16

\* Approximated from combustible gas content readings from an MSA Gascope Model 53 CGI

**TABLE 2**  
**FIELD ORGANIC ANALYSIS - GAS VENT VAPOR**  
**POWELL ROAD LANDFILL**  
**HUBER HEIGHTS, OHIO**

Parameter (mg/m3)	Vent Number														
	Round 1														
	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
Benzene	-	0.2	38	1	-	-	-	2	-	-	-	3	0.3	-	3
Chlorobenzene	9	18	55	5	9	23	14	14	28	-	9	0.5	5	-	14
Chloroethane*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	4	0.2	-	-	-	-	48	32	1	-	36	-	4	12	32
1,2-Dichloroethane	-	-	-	-	-	-	8	8	-	-	2	-	-	-	-
trans-1,2-Dichloroethene*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethyl benzene*	-	9	65	13	39	30	38	34	-	-	39	9	22	13	26
Methylene chloride*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene*	-	-	-	7	7	-	63	77	-	-	7	2	14	-	27
Toluene*	209	75	295	56	75	120	116	120	194	49	116	22	64	217	75
1,1,1-Trichloroethane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene*	-	1	16	-	-	-	-	-	-	-	-	-	2	-	-
Vinyl chloride	26	23	26	31	36	20	44	26	23	8	36	31	26	33	38
Xylenes*	17	4	9	30	116	43	82	73	25	4	116	22	66	62	56

- = Parameter not detected

\* = Mandatory performance standard parameter

TABLE 2 (continued)

Parameter (mg/m3)	Vent Number													
	Round 1 (Continued)					Round 2								
	V16	V17	V18	V19	V20	V1	V3	V9	V10 (11:00)	V15	V18	V19	PR201 (17:00)	V10 (17:00)
Benzene	0.3	0.3	-	-	0.3	4	11	11	3	7	7	0	11	4
Chlorobenzene	5	14	9	18	9									
Chloroethane*	-	-	-	-	-									
1,1-Dichloroethane	4	16	60	32	8									
1,2-Dichloroethane	-	-	-	-	-									
trans-1,2-Dichloroethene*	-	-	-	-	-									
Ethyl benzene*	13	39	22	17	2									
Methylene chloride*	-	-	-	-	-									
Tetrachloroethene*	7	55	14	3	3									
Toluene*	60	165	116	22	7	168	261	314	138	99	186		185	180
1,1,1-Trichloroethane	-	-	-	-	-									
Trichloroethene*	-	4	5	2	-									
Vinyl chloride	23	31	44	44	-	78	96	143	108	119	124	65	45	115
Xylenes*	-	121	43	22	17									

- = Parameter not detected

\* = Mandatory performance standard parameter

Blank space = Not analyzed

TABLE 3

## VOLATILE ORGANIC ANALYSIS - GAS VENT LIQUID

POWELL ROAD LANDFILL  
HUBER HEIGHTS, OHIO

Parameters (µg/l.)	CRQL (µg/l.)	Sample Number/(Vent Number)								
		L03Z01(a) (V3)	L04Z01(a) (V4)	L05Z01(b) (V5)	L0501D(a) (V5)	L07Z01(a) (V7)	L10Z01(c) (V10)	L12Z01(a) (V12)	L14Z01(d) (V14)	L1401D(d) (V14)
Vinyl chloride	10	9 J	-	-	6 J	-	68 J	4 J	6 J	5 J
Chloroethane	10	-	-	-	-	-	-	2 J	-	-
Methylene chloride	5	2 J	-	-	-	3 J	-	-	-	-
Acetone	10	450 D	-	380 B	270 BD	-	3,900 BD	-	-	35
Carbon disulfide	5	-	-	-	-	1 J	-	20	-	3 J
1,1-Dichloroethane	5	-	-	5 J	-	-	-	-	-	-
1,2-Dichloroethane (total)	5	4 J	-	3 J	-	-	11 J	2 J	-	-
Chloroform	5	-	-	-	-	-	-	-	-	-
2-Butanone	10	780 D	20	500	430 D	64	5,500 D	-	-	43
1,2-Dichloropropane	5	3 J	1 J	-	-	-	-	-	-	-
Trichloroethene	5	-	-	-	-	-	-	-	-	-
Benzene	5	6	6	4 J	-	4 J	11 J	3 J	5 J	5 J
trans-1,3-Dichloropropene	5	-	-	-	-	2 J	-	-	-	-
4-Methyl-2-pentanone	10	120	25	120 B	90 B	-	500	-	150	110
2-Hexanone	10	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5	-	-	3 J	-	-	-	-	-	3 J
Toluene	5	320 D	27	270	66 B	7	390	13	38	37
Chlorobenzene	5	2 J	3 J	6 J	2 J	3 J	10 J	1 J	4 J	2 J
Ethylbenzene	5	110	140	110	26	100	100	41	110	120
Styrene	5	-	-	-	-	-	15 J	-	-	-
Total xylenes	5	260 D	290 E	360	82	310 E	330	32	530 E	490 BE
<b>Total VOCs</b>		<b>2,066</b>	<b>512</b>	<b>1,761</b>	<b>972</b>	<b>494</b>	<b>10,835</b>	<b>118</b>	<b>873</b>	<b>883</b>

CRQL = Contract-required quantitation limit

- = Parameter not detected

B = Compound detected in blank as well as sample

D = Concentration determined through dilution of sample

E = Concentration exceeds calibration range

J = Estimated value

(a) Detection levels consistent with CRQL.

(b) Detection levels 2.5x greater than CRQL.

(c) Detection levels 10x greater than CRQL.

(d) Detection levels 2x greater than CRQL.

TABLE 3 (continued)

Parameters (µg/L)	CRQL (µg/L)	Sample Number/(Vent Number)						
		L15Z01(c) (V15)	L16Z01(e) (V16)	L17Z01(a) (V17)	L18Z01(f) (V18)	L20Z01(a) (V20)	L20101 (PR201)	102Z01 (Field blank) 103Z01 (Field blank)
Vinyl chloride	10	-	8 J	-	17 J	1 J	5 J	-
Chloroethane	10	-	-	2 J	-	18	-	-
Methylene chloride	5	24 BJ	-	-	-	-	10 J	2 J 14 B
Acetone	10	670 B	-	42	27,000 D	-	62	-
Carbon disulfide	5	-	13	6	6 J	-	-	-
1,1-Dichloroethane	5	-	6 J	13	-	1 J	-	-
1,2-Dichloroethene (total)	5	-	8	-	-	19	86	-
Chloroform	5	-	-	-	-	-	-	1 J
2-Butanone	10	1,500	20	75	39,000 D	99	53	-
1,2-Dichloropropane	5	-	-	-	-	-	-	-
Trichloroethene	5	-	2 J	-	-	2 J	-	-
Benzene	5	19 J	7	4 J	9 J	6	5 J	-
trans-1,3-Dichloropropene	5	-	-	-	-	-	-	-
4-Methyl-2-pentanone	10	54 J	29	14	2,600 D	4 J	230	-
2-Hexanone	10	-	-	-	300	-	-	-
Tetrachloroethene	5	-	2 J	-	-	-	-	-
Toluene	5	220	190	13	630	4 J	600	-
Chlorobenzene	5	-	3 J	1 J	-	10	-	-
Ethylbenzene	5	99	110	120	62	-	50	-
Styrene	5	-	-	-	11 J	-	-	-
Total xylenes	5	280	260 E	290 E	160	54	170	-
<b>Total VOCs</b>		<b>2,866</b>	<b>658</b>	<b>580</b>	<b>69,795</b>	<b>218</b>	<b>1,271</b>	

CRQL = Contract-required quantitation limit

- = Parameter not detected

B = Compound detected in blank as well as sample

D = Concentration determined through dilution of sample

E = Concentration exceeds calibration range

J = Estimated value

(a) Detection levels consistent with CRQL.

(c) Detection levels 10x greater than CRQL.

(e) Detection levels 1.3x greater than CRQL.

(f) Detection levels 5x greater than CRQL.

**TABLE 4**  
**SEMIVOLATILE ORGANIC ANALYSIS - GAS VENT LIQUID**

**POWELL ROAD LANDFILL  
HUBER HEIGHTS, OHIO**

Parameters (µg/L)	CRQL (µg/L)	Sample Number/(Vent Number)								
		L03Z01(a) (V3)	L04Z01(a) (V4)	L05Z01(a) (V5)	L0501D(a) (V5)	L07Z01(a) (V7)	L10Z01(b) (V10)	L12Z01(a) (V12)	L14Z01(a) (V14)	L1401D(a) (V14)
Phenol	10	16	-	330	200 D	3 J	1,200	9 J	-	4 J
1,4-dichlorobenzene	10	9 J	28	-	14	35	17 J	8 J	3 J	3 J
Benzyl alcohol	10	-	-	-	-	-	32 J	-	-	-
1,2-dichlorobenzene	10	-	5 J	-	-	-	-	-	-	-
2-Methylphenol	10	11	-	10 J	13	3 J	-	-	3 J	6 J
4-Methylphenol	10	26	-	340	1,600 D	10	190	-	-	7 J
Nitrobenzene	10	-	-	-	-	-	-	-	-	-
Isophorone	10	-	-	-	2 J	-	-	-	-	-
2,4-Dimethylphenol	10	10	-	4 J	8 J	9 J	-	-	-	-
Benzoic acid	50	-	-	180	310 D	-	110 J	-	-	-
Naphthalene	10	7 J	26	26	31	36	19 J	-	-	4 J
2-Methylnaphthalene	10	11	8 J	-	5 J	14	13 J	-	-	-
Acenaphthene	10	-	-	-	-	7 J	-	-	-	-
Dibenzofuran	10	26	-	-	-	6 J	-	-	-	-
Diethyl phthalate	10	86	-	12 J	25	4 J	-	-	3 J	3 J
Fluorene	10	-	-	-	-	7 J	-	2 J	-	-
N-Nitrosodiphenylamine (1)	10	-	-	7 J	-	-	-	-	-	-
Pentachlorophenol	50	-	-	-	-	-	-	-	-	-
Phenanthrene	10	-	-	-	-	4 J	-	6 J	-	-
Anthracene	10	-	-	-	-	6 J	-	2 J	-	-
Di-n-butyl phthalate	10	-	-	-	5 J	-	-	-	-	-
Fluoranthene	10	-	-	-	-	14	-	-	-	-
Pyrene	10	-	-	-	-	9 J	-	-	-	-
Butylbenzyl phthalate	10	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	10	-	-	-	-	6 J	-	-	-	-
Crysene	10	-	-	-	-	3 J	-	-	-	-
bis(2-Ethylhexyl)phthalate	10	62	-	-	-	4 J	-	11	-	18
Di-n-octyl phthalate	10	3 J	-	-	2 J	-	-	-	9 J	29
<b>Total Semivolatiles</b>		<b>267</b>	<b>67</b>	<b>909</b>	<b>2,215</b>	<b>258</b>	<b>1,581</b>	<b>38</b>	<b>18</b>	<b>74</b>

CRQL = Contract-required quantitation limit

- = Parameter not detected

D = Concentration determined through dilution of sample

J = Estimated value

(a) Detection level consistent with CQRL

(b) Detection level 5x greater than CQRL

TABLE 4 (continued)

Parameters (µg/L)	CRQL (µg/L)	Sample Number/(Vent Number)						102Z01 (Field blank)	103Z01 (Field blank)
		L15Z01(a) (V15)	L16Z01(a) (V16)	L17Z01(a) (V17)	L18Z01(b) (V18)	L20Z01(a) (V20)	L20101 (PR201) (2X)		
Phenol	10	50	5 J	-	300	-	2X	-	-
1,4-dichlorobenzene	10	19	28	7 J	-	3 J	-	-	-
Benzyl alcohol	10	-	-	-	-	-	-	-	-
1,2-dichlorobenzene	10	-	-	-	-	-	-	-	-
2-Methylphenol	10	7 J	-	3 J	15 J	-	14 J	-	-
4-Methylphenol	10	130	-	-	2,600 D	-	470	-	-
Nitrobenzene	10	-	21 J	-	-	-	-	-	-
Isophorone	10	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	10	-	-	-	-	-	-	-	-
Benzoic acid	50	-	-	-	5,600 D	-	-	-	-
Naphthalene	10	21	-	24	-	8 J	-	-	-
2-Methylnaphthalene	10	5 J	-	6 J	-	-	-	-	-
Acenaphthene	10	3 J	-	-	-	-	-	-	-
Dibenzofuran	10	3 J	-	-	-	-	-	-	-
Diethyl phthalate	10	27	10	6 J	84	-	-	-	-
Fluorene	10	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine (1)	10	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	50	-	21 J	-	-	-	-	-	-
Phenanthrene	10	5 J	-	-	-	7 J	-	-	-
Anthracene	10	-	-	-	-	-	-	-	-
Di-n-butyl phthalate	10	5 J	-	-	-	-	-	-	-
Fluoranthene	10	-	-	-	-	5 J	-	-	-
Pyrene	10	-	-	-	-	4 J	-	-	-
Benzylbenzyl phthalate	10	-	-	-	23 J	-	-	-	-
Benzo(a)anthracene	10	-	-	-	-	-	-	-	-
Crysene	10	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	10	-	-	12	130	-	34	-	-
Di-n-octyl phthalate	10	-	-	2 J	-	-	-	-	-
<b>Total Semivolatiles</b>		<b>275</b>	<b>85</b>	<b>60</b>	<b>8,752</b>	<b>27</b>	<b>808</b>		

CRQL = Contract-required quantitation limit

- = Parameter not detected

D = Concentration determined through dilution of sample

J = Estimated value

(a) Detection level consistent with CRQL.

(b) Detection level 5x greater than CRQL.



**TABLE 5**  
**INORGANIC ANALYSIS - GAS VENT LIQUID**

**POWELL ROAD LANDFILL  
HUBER HEIGHTS, OHIO**

		Sample Number/(Vent Number)								
Parameters	CRDL	L03Z01 (V3)	L04Z01 (V4)	L05Z01 (V5)	L0601D (V5)	L07Z01 (V7)	L10Z01 (V10)	L12Z01 (V12)	L14Z01 (V14)	L1401D (V14)
Selected Metals (µg/L)										
Arsenic	10	10 SN	551 N	238 N	240 N	560 N	527 N	33 SN	[12] N	17 SN
Barium	200	[142]	2,010	1,060	968	3,200	2,560	427	412	327
Cadmium	5	-	9.6	[4.8]	-	8.6	-	-	-	-
Chromium	10	56	633	279	263	1,080	-	57	84	74
Cobalt	5	209	984	670	676	1,740	355	56	399	343
Mercury	0.2	-	5.6	1.5	2.6	6	37	0.5	0.7	0.5
Selenium	5	-	-	-	-	-	-	-	-	-
Silver	10	-	-	[5.4]	-	-	-	-	-	-
Other Inorganics (µg/L)										
Cyanide	10	16 N	18 N	17 N	21 N	89 N	172 N	-	-	-
Sroutium	-	1,060	3,820 N	2,110 N	2,050	4,570 N	5,140 N	600 N	834 N	693 N
Aluminum	200	501	398,000	117,000	104,000	664,000	2,680	38,900	4,450	3,510
Antimony	60	-	93 N	114 N	[54] N	-	-	[51] N	-	-
Beryllium	5	-	20	[2.8]	[1.4]	33	[17]	-	-	-
Calcium	5,000	209,000	2,390,000	1,590,000	1,540,000	4,820,000	6,200,000	395,000	542,000	381,000
Cobalt	50	[16]	360	177	155	697	67	[32]	[47]	54
Copper	25	29 E	1,040	343	295	1,510 E	-	86 E	58 E	53
Iron	100	19,500	1,160,000	923,000	858,000	2,160,000	720,000	78,200	42,100	35,900
Magnesium	500	221,000	1,270,000	596,000	570,000	1,980,000	2,750,000	180,000	456,000	420,000
Manganese	15	559	9,330 E	8,130 E	7,770 E	20,800	12,800 E	1,470	669	494
Nickel	40	108	995	553	486	1,710	87	119	261	274
Potassium	5,000	253,000	64,200	166,000	161,000	904,000	[2,840]	132,000	716,000	842,000
Sodium	5,000	350,000	45,600	107,000	106,000	992,000	21,000	183,000	762,000	905,000
Thallium	10	-	-	-	-	-	-	-	-	-
Vanadium	50	[6.2]	749	254	227	1,440	[23]	90	[20]	[19]
Zinc	20	67,300	261,000	323,000	394,000	1,620,000	347,000	2,280	87,600	75,000

CRDL = Contract-required detection limit.

- = Parameter not detected.

E = Indicates a value estimated or not reported owing to the presence of interference.

N = Indicates spike sample recovery is not within control limits.

S = Indicates value determined by method of standard addition.

\* = Indicates duplicate analysis is not within control limits.

[ ] = Value reported is less than CRDL.

+ = Indicates the correlation coefficient for method of standard addition is less than 0.995.

TABLE 5 (continued)

Parameters	CRDL	L15Z01 (V15)	L16Z01 (V16)	L17Z01 (V17)	L18Z01 (V18)	L20Z01 (V20)	L20101 (PM201)	102Z01 (Field blank)	103Z01 (Field blank)
<b>Selected Metals (µg/L.)</b>									
Antic	10	433 N	166 N	32 SN	42 SN	295 N	27 S+	[29] N	
Barium	200	1,800	800	246	[114]	5,500	275	[20]	
Cadmium	5	29	12	-	130	-	11		
Chromium	10	414	137	25	112	-	156		
Lead	5	997	695	95	2,060	-	1,040		
Mercury	0.2	1.2	0.7	0.4	7.4	1.6	13	0.24	
Selenium	5	-	-	-	-	-	-		
Silver	10	-	-	-	-	-	-		
<b>Other Inorganics (µg/L.)</b>									
Cyanide	10	254 N	82 N	-	114 N	26 N	-		
Selenium	-	5,720 N	4,700	1,110 N	727 N	6,710 N	892 N	1.6 N	
Aluminum	200	269,000	72,500	12,600	4,130	521	14,200 *		[12]
Antimony	60	93 N	98 N	-	-	81,000 N	71		
Beryllium	5	11	[36]	-	-	[1.2]	-		
Calcium	5,000	1,660,000	597,000	482,000	611,000	7,000,000	229,000	[221]	[131]
Cobalt	50	277	84	[17]	66	101	85		
Copper	25	802	227 E	50	118	-	133	70 E	66
Iron	100	938,000	334,000	167,000	54,800	738,000	354,000 *	[59]	110
Magnesium	500	779,000	378,000	151,000	1,280,000	2,900,000	58,700		
Manganese	15	8,830 E	2,260	3,550	528	35,800 E	1,500	[2.4]	[4.9] E
Nickel	40	713	318	82	382	77	843		
Potassium	5,000	387,000	540,000	157,000	1,210,000	105,000	39,800		9,660
Sodium	5,000	562,000	797,000	234,000	2,150,000	119,000	141	[1,910]	
Thallium	10	-	-	-	-	-	-		
Vanadium	50	498	166	[34]	[28]	[27]	[43]		
Zinc	20	22,400	11,100	6,610	284,000	2,350	4,500	[14]	[16]

CRDL = Contract-required detection limit.

- = Parameter not detected.

E = Indicates a value estimated or not reported owing to the presence of interference.

N = Indicates spike sample recovery is not within control limits.

S = Indicates value determined by method of standard addition.

\* = Indicates duplicate analysis is not within control limits.

[ ] = Value reported is less than CRDL.

+ = Indicates the correlation coefficient for method of standard addition is less than 0.995.

**TABLE 6**  
**SURFACE LEACHATE ANALYSIS**  
**POWELL ROAD LANDFILL**  
**HUBER HEIGHTS, OHIO**

	CRDL	H01Z01		CRQL	H01Z01
<b>Selected Metals (µg/L)</b>			<b>Volatile Organics (µg/L)</b>		
Arsenic	10	[9.5]	Chloroethane	10	77
Barium	200	[151]	Methylene chloride	5	27
Cadmium	5	-	Benzene	5	7
Chromium	10	49	Toluene	5	27
Lead	5	27	Chlorobenzene	5	9
Mercury	0.2	-	Ethylbenzene	5	31
Selenium	5	-	Total xylenes	5	84
Silver	10	-			
<b>Other Inorganics (µg/L)</b>			<b>Semivolatile Organics (µg/L)</b>		
Cyanide	10	479 N*	2-Methylphenol	10	27
Strontium	-	739	Naphthalene	10	17
Aluminum	200	548*	4-Chloro-3-methylphenol	10	27
Antimony	60	-	Dicetyl phthalate	10	31
Beryllium	5	[1.1]	Is(2-Ethylhexyl)phthalate	10	84
Calcium	5,000	76,000			
Cobalt	50	51			
Copper	25	85			
Iron	100	2,310			
Magnesium	500	225,000			
Manganese	15	62 E			
Nickel	40	328			
Potassium	5,000	1,270,000			
Sodium	5,000	1,288,000			
Thallium	10	-			
Vandium	50	[11]			
Zinc	20	387			

CRDL = Contract-required detection limit.

- = Parameter not detected

E = Indicates a value estimated or not reported owing to the presence of interference.

N = Indicates spike sample recovery is not within control limits.

S = Indicates value determined by method of standard addition.

\* = Indicates duplicate analysis is not within control limits.

[ ] = Value reported is less than CRDL.

CRQL = Contract required quantitation limit  
J = Estimated value

**TABLE 7**  
**AMBIENT AIR TENAX TUBE ANALYSIS RESULTS**  
**POWELL ROAD LANDFILL**  
**HUBER HEIGHTS, OHIO**

		Sample I.D.												
Compound (mg/m3)	Approximate Detection Limit*	October 26, 1988							October 27, 1988					
		Upwind	Onsite					Downwind	Upwind	Onsite			Downwind	
		A-05	A-02	A-01	A-03	A-04	A-06	A-07	A-14	A-13	A-11	A-10	A-09	A-08
Benzene	0.0014	0.001 J	-	-	-	-	-	-	-	0.001 J	0.001 J	0.001 J	-	0.001 J
Carbon disulfide	0.0005	-	-	-	-	-	-	-	-	-	-	0.001	-	-
Carbon tetrachloride	0.0004	0.001	0.001	-	-	-	-	-	-	0.001	0.001	-	0.001	0.001
Methylene chloride	0.0005	0.003	0.003	0.001	0.002	0.001	0.002	0.001	-	0.002	0.001	0.001	0.001	0.002
Tetrachloroethene	0.0005	-	-	-	-	-	-	-	-	-	-	0.001 J	-	-
Toluene	0.0008	0.003	0.002	0.003	0.001	0.001 J	0.002	0.001	-	0.005	0.003	0.003	0.003	0.002
1,1,1-Trichloroethane	0.0004	0.003	0.002	0.001	0.002	0.001	0.001	0.001	-	0.002	0.002	0.002	0.003	0.001
Trichloroethene	0.0005	-	-	-	-	-	-	-	-	0.009	-	-	-	-
Trichlorofluoromethane	0.0009	0.005	0.007	0.003	0.004	0.002	0.004	0.002	-	-	0.003	0.003	0.017	0.013
Xylenes	0.0012	0.005	0.002	0.002	-	0.001 J	0.002	0.001	-	0.004	0.004	0.003	0.005	0.002
Total VOCs		0.021	0.017	0.010	0.009	0.006	0.011	0.006	-	0.024	0.015	0.015	0.033	0.021

\* Detection limits vary with each sample according to volume sampled

J = Estimated value less than minimum detection limit

- = Not detected

Note: Trip blank A-12 was broken upon receipt by the lab and was not analyzed

Note: Values rounded to the nearest 0.001 mg/m3

TABLE 8

DETECTION SUMMARY \*  
SEDIMENT  
(Concentrations reported in mg/kg)

POWELL ROAD LANDFILL  
HADES RIGHTS, OHIO

Sample with Duplicate	Parameters											
	Acetone	Benz(h)- fluoranthene	4,4'-Dinitro-2- methylphenol	Barium	Chromium	Lead	Calcium	Copper	Iron	Magnesium	Manganese	Nickel
S01Z01	-	-	-	52	43	13	107,000	69	7,490	49,200	187	11
S0101D(DUP)	-	-	-	-	64	82	106,000	-	5,570	39,600	161	10
S02Z01	-	0.54	-	79	17	33	78,000	17	13,100	28,800	303	18
S03Z01	0.024	-	-	-	91	13	132,000	12	10,700	36,600	383	14
S03Z02(DUP)	-	-	1.9	-	10	13	90,700	87	8,920	29,000	181	13
S04Z01	-	-	-	185	18	28	119,000	20	15,000	19,000	458	23
S05Z01	-	-	-	49	83	35	78,900	84	7,720	28,400	186	11
S06Z01	-	-	-	-	59	10	60,600	14	8,290	21,800	321	11
S07Z01	-	-	-	-	30	60	130,000	93	4,290	43,700	266	-
S08Z01	-	-	-	54	-	79	130,000	61	3,320	50,600	183	-

\* - Detected above contract-required quantitation limit (CRQL) or contract-required detection limit (CRDL.)

\*\* - Not detected above CRQL or CRDL, or otherwise qualified.

**TABLE 9**  
**DETECTION SUMMARY \***  
**SURFACE WATER**  
(Concentrations reported in µg/l.)

**POWELL ROAD LANDFILL**  
**HUBER HEIGHTS, OHIO**

Sample with Detection	Sampling Event **	Parameters													
		Methylene Chloride	Chromium	Lead	Mercury	Cyanide	Strontium	Aluminum	Calcium	Iron	Magnesium	Manganese	Potassium	Sodium	Zinc
W01Z01	1	-	-	-	-	-	1,590	774	70,800	1,010	35,000	-	2,890	-	70
W0101X(DUP)	1	-	-	-	-	-	1,580	646	70,100	856	34,700	-	-	-	21
W01Z02	2	-	19.1	10.2	-	-	454	13,600	56,800	20,800	20,900	253	5,500	8,800	157
W02Z01	1	-	-	-	-	-	1,570	870	71,700	1,200	34,600	-	-	-	55
W02Z02	2	-	10.8	10	0.2	-	433	13,400	48,500	18,000	19,200	214	-	-	106
W03Z01	1	4	-	-	-	-	1,520	605	67,200	913	34,300	-	5,730	-	88
W03Z02(DUP)	2	-	-	-	-	-	1,550	749	68,100	954	34,800	-	5,030	-	46
W03Z02	2	-	16.2	9.4	-	16.2	463	14,600	53,000	17,600	20,500	202	-	-	106
W04Z01	1	-	-	-	-	-	1,700	996	81,600	1,420	36,100	-	5,700	-	21
W04Z02	2	-	18.8	11.9	-	18.3	406	16,700	47,100	22,500	19,100	264	-	-	154
W05Z01	1	-	-	-	-	-	469	-	64,700	-	35,100	-	-	-	55
W05Z02	2	-	-	-	-	-	441	-	65,900	289	29,800	15.3	-	13,300	16.5
W06Z01	1	-	-	-	-	-	135	315	52,100	753	17,300	20	-	21,900	87
W06Z02	2	-	-	9.2	-	-	108	5,640	55,300	8400	20,400	168	-	12,900	89.1
W06Z02(DUP)	2	-	-	9.2	-	-	110	5,120	57,000	8490	21,000	174	-	14,500	102
W07Z01	1	-	-	-	-	-	174	-	32,200	332	11,000	-	-	14,300	62
W07Z02	2	-	-	-	-	-	178	721	59,700	1430	10,700	36.4	-	21,300	52.6
W08Z01	1	-	-	13	-	-	137	476	54,300	1060	10,100	21	-	22,100	161
W08Z02	2	-	-	8	0.27	-	158	3,630	83,000	6300	31,100	192	-	15,700	64.3

\* - Detected above contract-required quantitation limit (CRQL) or contract-required detection limit (CRDL).

\*\* - Not detected above CRQL, CRDL, or otherwise qualified.

\*\* Sampling Event 1 - Samples collected September/October 1988

Sampling Event 2 - Samples collected April 1989.

**TABLE 10**  
**DETECTION SUMMARY \***  
**SURFICIAL SOILS**  
(Concentrations reported in mg/kg)

**POWELL ROAD LANDFILL**  
**HUBER HEIGHTS, OHIO**

Sample with Detection	Parameters														
	4,4'-DDT	Aroclor- 1016	Aroclor- 1254	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Aluminum	Calcium	Copper	Iron	Magnesium	Manganese
F01Z01	-	-	-	19	106	-	16	38	-	11,800	-	-	-	-	-
F0101D(DUP)	-	-	-	-	108	-	16	35	-	12,400	-	-	-	-	-
F02Z01	-	-	-	-	61	-	11	-	-	8,200	-	-	-	-	-
F0201D(DUP)	-	-	-	-	74	-	12	-	-	9,580	-	-	-	-	-
F03Z01	-	3.1	-	-	51	-	8.3	9.6	-	-	116,000	15	12,100	55,400	344
F04Z01	-	-	-	-	86	-	14	15	-	-	84,700	21	19,900	35,700	346
F05Z01	-	-	-	-	-	-	6.9	5.5	-	-	131,000	13	7,590	50,000	229
F06Z01	-	-	-	-	71	-	15	-	-	9,010	-	-	-	-	-
F07Z01	-	-	-	-	95	-	18	27	-	11,400	-	-	-	-	-
F08Z01	-	-	-	-	78	-	13	-	-	8,840	-	-	-	-	341
F09Z01	-	-	-	19	122	-	32	32	-	12,900	-	-	-	-	-
F10Z01	-	-	1.2	-	86	-	15	35	-	10,600	-	-	-	-	-
F11Z01	-	-	0.26	-	74	-	13	28	-	7,860	-	-	-	-	-
F12Z01 (a)	0.004	-	-	-	58	-	14	39	0.13	6,820	-	-	-	-	-
F13Z01	-	-	-	-	99	-	8.9	-	-	-	116,000	16	14,400	39,000	-
F14Z01	-	-	-	-	108	-	15	24	0.12	12,700	-	-	-	-	-
F15Z01	-	-	-	-	70	-	9.4	25	-	-	96,800	18	14,600	38,800	321
F16Z01	-	-	-	7	106	-	10	40	-	-	45,700	26	13,900	19,400	934
F17Z01	-	-	-	-	82	-	12	27	-	-	36,700	20	16,600	15,700	556
F18Z01	-	-	-	-	64	-	12	-	-	10,600	-	-	-	-	-
F19Z01	-	-	-	-	55	-	7.6	9.5	-	-	101,000	14	11,300	44,400	264
F1901D(DUP)	-	-	-	-	-	-	6.8	9.1	-	-	102,000	14	9,530	40,400	285
F20Z01	-	-	-	-	-	-	4.6	11	-	-	117,600	12	8,310	47,800	215
F21Z01	-	-	-	-	83	-	12	-	-	8,890	-	-	-	-	-
F22Z01	-	-	-	-	78	-	7.8	-	-	6,160	-	-	-	-	-
F23Z01	-	-	-	-	48	-	8.4	-	-	6,480	-	-	-	-	-
F24Z01	-	-	-	-	54	-	5.5	12	-	-	112,000	10	10,800	45,900	295
F25Z01 (a)	-	-	-	-	109	1.2	24	34	-	10,400	62,300	-	-	-	-
F26Z01	-	-	-	-	121	1.4	31	41	-	-	62,300	28	18,100	20,800	457
F27Z01	-	-	-	20	100	-	20	25	-	12,000	-	-	-	-	-
F28Z01	-	-	0.32	-	114	-	28	39	-	-	62,400	34	21,900	22,500	452
F29Z01	-	-	-	-	83	-	13	63	-	-	61,500	25	18,000	32,900	336
F30Z01	-	-	-	-	-	-	6.8	23	-	-	118,000	20	9,740	48,700	249
F31Z01	-	-	-	-	47	-	7.4	8.9	-	-	98,500	15	11,900	45,400	257
F32Z01	-	-	-	-	-	-	5.5	5.6	-	-	119,000	6.8	7,500	49,200	206

\* - Detected above contract required quantitation limit (CRQL) or contract required detection limit (CRDL)

\*\* - Not detected above CRQL, CRDL, or otherwise qualified.

TABLE 10 (continued)

Sample with Detection	Parameters					(a) Semivolatiles were found in the following samples (µg/kg)	F11Z01	F15Z01
	Nickel	Potassium	Sodium	Vanadium	Zinc			
F01Z01	18	1,800	-	26	-			
F0101D(DUP)	17	-	-	27	-	Fluoranthene	4,700	-
F02Z01	22	-	-	-	-	Anthracene	1,200	-
F0201D(DUP)	13	2,670	-	-	-	Fluoranthene	5,000	400
F03Z01	18	-	-	16	60	Pyrene	3,900	440
F04Z01	23	2,040	-	25	82	BenZ(a)anthracene	2,400	-
F05Z01	9	-	-	-	42	Crystalline	2,400	-
F06Z01	12	-	-	21	-	BenZ(b)fluoranthene	1,200	-
F07Z01	19	-	-	25	-	BenZ(k)fluoranthene	2,200	-
F08Z01	18	-	-	21	-	BenZ(a)pyrene	1,200	-
F09Z01	23	-	-	26	-	Isocoumarin, 1,2,3,4,8,9-hexahydro-6H-pyrene	1,100	-
F10Z01	18	-	-	24	-	BenZ(h,h')perylene	1,200	-
F11Z01	12	-	-	19	-			
F12Z01 (a)	12	-	-	17	-			
F13Z01	20	-	-	18	60			
F14Z01	16	-	-	32	87			
F15Z01	13	-	-	22	82			
F16Z01	-	-	-	17	-			
F17Z01	13	-	-	24	-			
F18Z01	15	3,200	-	-	-			
F19Z01	12	1,240	1,350	13	-			
F1901D(DUP)	10	1,700	1,370	-	-			
F20Z01	-	-	-	11	-			
F21Z01	14	2,440	-	-	-			
F22Z01	13	-	-	-	-			
F23Z01	12	1,550	-	-	-			
F24Z01	14	-	-	-	40			
F25Z01 (a)	17	2,470	-	-	-			
F26Z01	18	-	-	27	-			
F27Z01	18	3,540	-	29	-			
F28Z01	27	-	-	28	-			
F29Z01	16	-	-	28	-			
F30Z01	13	-	-	12	-			
F31Z01	15	-	-	15	-			
F32Z01	12	-	-	-	28			

\* - Detected above contract required quantitation limit (CRQL) or contract required detection limit (CRDL)

\*\* - Not detected above CRQL, CRDL, or otherwise specified



TABLE 11

DETECTION SUMMARY \*  
 SUBSURFACE SOIL  
 (Concentrations reported in mg/kg)

POWELL ROAD LANDFILL  
 NUBER HEIGHTS, OHIO

Sample with Detection	Parameters									
	Aroclor-1254	Antimony	Barium	Cadmium	Chromium	Lead	Mercury	Strontium	Aluminum	Calcium
B02Z01	-	48	51	-	86	7	-	108	6,560	127,000
B03Z01	-	67	91	-	17	22	-	63	11,800	62,800
B05Z01	-	-	243	-	29	151	-	89	16,100	54,200
B08Z01	-	-	154	2.1	51	47	0.15	269	16,400	64,500
B09Z10	-	-	136	-	37	30	-	141	16,400	50,700
B10Z01	2	5.4	88	-	23	91	0.18	90	7,910	87,000
B11Z01	-	-	96	-	17	21	-	28	14,300	19,500
B12Z01	0.25	-	-	-	10	152	-	77	4,390	117,000
B15Z01	-	-	80	-	17	16	-	30	14,800	37,700
B25Z01	-	3.8	-	-	10	96	-	120	3,880	82,700
B25O1D(DUP)	-	-	-	-	53	53	-	42	3,140	-
B28Z01	-	4.4	62	-	11	14	-	102	6,940	88,100
B28O1D(DUP)	-	4.3	55	-	99	91	-	84	5,770	88,200
B29Z01	-	-	116	-	19	88	-	30	17,100	27,100

Sample with Detection	Parameters										Bis(2-Ethylhexyl) Phthalate
	Copper	Iron	Magnesium	Manganese	Nickel	Potassium	Vanadium	Zinc	Fluoranthene	Pyrene	
B02Z01	56	11,300	52,800	234	14	-	17	44	-	-	-
B03Z01	13	18,500	25,500	467	18	1,470	28	94	-	-	-
B05Z01	36	23,700	21,000	279	23	1,500	37	318	-	-	-
B08Z01	29	21,800	22,300	577	32	-	35	157	-	-	-
B09Z10	21	21,500	19,000	501	30	-	36	119	-	-	-
B10Z01	53	14,600	33,700	333	18	-	22	139	-	-	-
B11Z01	12	20,600	9,400	658	18	-	35	89	0.64	0.6	-
B12Z01	23	9,220	50,700	308	12	-	14	112	0.38	0.16	2
B15Z01	10	19,600	19,300	693	20	-	33	75	-	-	-
B25Z01	-	7,710	27,800	232	11	-	12	36	-	-	-
B25O1D(DUP)	-	7,500	1,120	258	-	-	-	32	-	-	-
B28Z01	9.4	11,100	27,000	343	9.3	-	19	61	-	-	-
B28O1D(DUP)	9.2	9,990	36,400	380	12	-	17	51	-	-	-
B29Z01	21	22,600	15,700	525	21	-	38	177	-	-	-

\* - Detected above contract required quantitation limit (CRQL) or contract required detection limit (CRDL).

\*\* - Not detected above CRQL, CRDL, or otherwise qualified.

**TABLE 12**  
**DETECTION SUMMARY \***  
**VOCs AND ARSENIC IN GROUND WATER**  
**(Concentrations reported in µg/L.)**

**POWELL ROAD LANDFILL**  
**MUSKIEG HEIGHTS, OHIO**

Wells With Detection	Sampling Event **	Parameters									
		Vinyl Chloride	Acetone	Chloroethane	Chlorobenzene	1,1-Dichloroethane	1,2-Dichloroethane (total)	Methylene Chloride	1,1,1-Trichloro- ethane	Trichloro- ethane	Arsenic
OnSite											
Upper Aquifer											
2A	4	-	-	-	-	7	6	-	-	-	-
3A	1	-	-	-	-	-	-	-	-	-	15
	2	28	-	-	-	-	46	-	-	-	16.4
	4	-	12	-	-	-	-	-	-	-	-
4A	1	-	-	98	-	7	-	-	-	-	16.2
	2	-	-	-	-	-	-	-	-	-	84
	4	-	-	27	6	8	-	-	-	-	-
5A	2	16	-	-	-	-	-	-	-	-	-
7A	1	12 (16 dup)	-	23 (31 dup)	-	28 (29 dup)	110 (120 dup)	-	48 (49 dup)	-	-
	2	-	-	-	-	-	-	-	10 (7 dup)	-	-
Primary Aquifer											
1B	2	-	-	-	-	-	-	6	-	-	-
4B	1	-	-	-	-	150	-	-	-	-	-
	2	-	-	-	-	128	-	-	-	-	10.9
	4	-	-	-	-	42	-	-	-	-	-
4BB	4	-	-	13	-	41 (130 duplicate)	-	-	-	-	-
12C	1	-	-	-	-	-	-	-	-	-	12
	2	-	-	-	-	-	-	-	-	-	13.5
OffSite											
Primary Aquifer											
13B	4	-	-	-	-	-	5	-	-	8	-
15B	4	-	-	-	-	-	-	-	-	7.1 (dup)	-

\* - Detected above contract-required quantitation limit (CRQL) or contract-required detection limit (CMDL).

\*\* - Not detected above CRQL, CMDL, or otherwise qualified.

\*\*\* - Sample collection dates:

Sample Event 1 - samples collected 12/1/1988

Sample Event 2 - Samples collected 4/1/1989

Sample Event 4 - Samples collected Jan/Feb-91

**TABLE 13**  
**SUMMARY OF CHEMICALS DETECTED IN THE**  
**ELDORADO PLAT AREA GROUND WATER MONITORING WELLS**  
(Concentrations reported in ug/L)

**POWELL ROAD LANDFILL**  
**HUBER HEIGHTS, OHIO**

Chemical	Frequency of Detection (a)	Arithmetic Mean (b)	Range of Detected Concentrations	RME Exposure Point Concentration (all wells)	USEPA Region V Exposure Point Concentration (c)
<b>Organics</b>					
1,2-Dichloroethene (total)*	2 / 10	2.7	3.3 - 3.8	2.9	3.8
bis(2-Ethylhexyl)phthalate*	1 / 6	3	3	3(d)	ND
Trichloroethene*	2 / 10	3	4.8 - 5.3	3.6	5.3
<b>Inorganics</b>					
Aluminum*	1 / 6	24	23.7	23.7(d)	2.8(d)
Arsenic	5 / 6	4.3	2 - 9.1	8.2	ND
Barium	6 / 6	240	126 - 340	340(d)	246(d)
Calcium	6 / 6	89,000	78,800 - 103,000	97,000	103,000(d)
Cobalt	5 / 6	5.7	3.4 - 8.8	8.8(d)	8.3(d)
Copper	3 / 6	6.8	5.1 - 7.6	7.6(d)	7.6(d)
Cyanide	1 / 6	5.6	8.5	6.8	ND
Iron	5 / 6	1,200	52 - 3,220	3,220(d)	3,220(d)
Lead*	2 / 6	2.4	2 - 2.7	2.7(d)	ND
Magnesium	6 / 6	35,000	30,600 - 39,700	39,000	39,700(d)
Manganese	5 / 6	64	26.6 - 148	148(d)	65.6(d)
Mercury	3 / 6	0.2	0.2	0.2(d)	ND
Potassium	5 / 6	3,900	2,500 - 5,580	5,580(d)	5,530(d)
Selenium	1 / 6	4.2	13	11	13(d)
Sodium	6 / 6	26,000	7,340 - 40,350	40,350(d)	19,400(d)
Strontium	6 / 6	1,000	301 - 1,495	1,495(d)	301(d)
Vanadium	6 / 6	5.6	2.7 - 8.5	8.5(d)	8.5(d)
Zinc	6 / 6	6.8	4.7 - 10.3	9.3	7.6(d)

\* = Chemicals of potential concern.

ND = Not detected in sample.

- (a) The number of samples in which the contaminant was detected divided by the total number of samples analyzed.
- (b) The arithmetic mean is calculated using the detected values and one-half of the quantization limit for non-detected values.
- (c) Grouping contains only wells MW13B and MW15B. These wells were considered to represent the "center of the plume" for the Eldorado Flat area as per U.S. EPA Region V Guidance (U.S. EPA/OEPA, 1991).
- (d) Maximum detected value used according to U.S. EPA guidance when the 95% UCL on the population mean exceeded the listed maximum value.

Source: Section 6 of the Remedial Investigation.

TABLE 14

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN FOR THE  
POWELL ROAD LANDFILL, OHIO  
(ORGANICS)

CHEMICAL	CAS VENT /APORS	LANDFILL LIQUIDS	SURFACE SOILS	SUBSURFACE SOILS	3-M.R. SEDIMENT	ON-SITE GROUNDWATER	ELDONADO PLAT GROUNDWATER	NEEDMORE GROUNDWATER
ACENAPHTHENE	nb	x	x	x	.	x	.	.
ACETONE	x	x	x	.	x	x	x	.
ANTHRACENE	nb	x	x	x	.	.	.	.
ANOCLOX 1016	.	.	x	.	.	.	.	.
ANOCLOX 1256	.	.	x	x	.	.	.	.
BENZENE	x	x	x	.	.	x	.	.
BENZOIC ACID	nb	x	x	.	.	x	.	.
BENZO(a)ANTHRACENE	nb	x	x	x	o	.	.	.
BENZO(b)PYRENE	nb	.	x	x	x	.	.	.
BENZO(b)FLUORANTHENE	nb	.	x	x	x	.	.	.
BENZO(g,h,i)PERYLENE	nb	.	x	x	x	.	.	.
BENZO(k)FLUORANTHENE	nb	.	x	x	o	.	.	.
BENZYL ALCOHOL	nb	x	x	.	.	.	.	.
BUTANONE (2-)	nb	x	x	.	.	x	.	.
BUTYLBENZYL PHTHALATE	nb	x	x	x	.	x	.	.
CARBON DISULFIDE	.	x	x	.	.	x	.	.
CHLORO (4-) METHYLPHENOL (3-)	nb	x	x	.	.	x	.	.
CHLOROBENZENE	x	x	x	.	.	x	.	.
CHLOROETHANE	.	x	x	.	.	x	.	x
CHLOROFORM	.	x	x	.	.	.	.	.
CHRYSENE	nb	x	x	x	o	.	.	.
DOT (4,6'-)	.	x	x	.	.	.	.	.
DIBENZOFURAN	nb	.	x	x	.	.	.	.
DIBENZO(a,h)ANTHRACENE	nb	.	x	x	.	.	.	.
DICHLOROBENZENE (1,2-)	nb	.	x	.	.	.	.	.
DICHLOROBENZENE (1,4-)	nb	.	x	.	.	.	.	.
DICHLOROBENZIDINE (3,3'-)	nb	.	.	x	.	.	.	.
DICHLOROETHANE (1,1-)	x	x	x	.	.	x	.	x
DICHLOROETHENE (1,2-)	x	x	x	.	.	x	.	x
DICHLOROPRAISM (1,2-)	nb	x	x	.	.	.	.	.
DICHLOROPRAISM (TRANS-1,3-)	nb	x	x	.	.	.	.	.
DIBENZYL PHTHALATE	nb	.	x	.	.	.	.	.
DIMETHYLPHENOL (2,6-)	nb	.	x	.	.	.	.	.
DINITRO(4,6-)METHYLPHENOL (2-)	nb	.	x	.	x	.	.	.
DI-N-BUTYL PHTHALATE	nb	.	x	.	.	.	.	.
DI-N-OCTYL PHTHALATE	nb	.	x	.	.	.	.	.
ETHYLBENZENE	x	x	x	.	.	.	.	.
BIS(2-ETHYLHEXYL)PHTHALATE	nb	x	x	x	x	x	x	x
FLUORANTHENE	nb	x	x	x	x	.	.	.
FLUORENE	nb	.	x	.	.	.	.	.
HEXANONE (2-)	nb	.	x	.	.	.	.	.
INDENOC(1,2,3-c,d)PYRENE	nb	.	x	x	o	.	.	.
ISOPHORENE	nb	.	x	.	.	.	.	.
METHYL (6-) PENTANONE (2-)	nb	.	x	.	.	.	.	.
METHYLBIPHENYLENE (2-)	nb	.	x	.	.	.	.	.
METHYLPHENOL (2-)	nb	.	x	.	.	.	.	.
METHYLPHENOL (6-)	nb	.	x	x	.	.	.	.
NAPHTHALENE	nb	x	x	.	.	.	.	.
NITROBENZENE	nb	x	x	.	.	.	.	.
N-NITRODIPHENYLAMINE	nb	x	x	.	.	.	.	.
PENTACHLOROPHENOL	nb	x	x	x	x	.	.	.
PHTHALANTHRENE	nb	x	x	.	.	.	.	.
PHENOL	nb	x	x	.	.	.	.	.
PYRENE	nb	x	x	x	o	.	.	.
STYRENE	x	.	x	.	.	.	.	.
TETRACHLOROETHENE	x	.	x	.	.	.	.	.
TOLUENE	x	.	x	.	.	.	.	.
TRICHLOROETHANE (1,1,1-)	x	.	.	.	.	.	.	.
TRICHLOROETHENE	x	.	x	.	.	.	.	.
VINYL CHLORIDE	x	.	x	.	.	.	.	.
XYLENES (TOTAL)	x	.	x	.	.	.	.	.

x = Selected as a chemical of potential concern.

o = Not selected; within background levels.

. = Not detected

nb = Not analyzed for.

G.M.R. = Great Miami River

TABLE 15

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN FOR THE  
POWELL ROAD LANDFILL, OHIO  
(INORGANICS)

CHEMICAL	LANDFILL LIQUIDS	SURFACE SOILS	SUBSURFACE SOILS	G.M.R. SEDIMENT	STREAM SEDIMENT	G.M.R. SURFACE WATER	STREAM SURFACE WATER	ON-SITE GROUNDWATER	ELDORADO PLAY AREA	NEEDMORE AREA
ALUMINUM	X	O	O	O	O	O	O	X	X	X
ANTIMONY	X	X	O	O	O	O	O	O	O	O
ARSENIC	X	O	O	O	O	X	X	O	O	O
BARIUM	X	O	X	O	O	X	X	O	O	O
BERYLLIUM	X	O	O	O	O	X	X	X	O	O
CADMIUM	X	X	X	O	O	O	O	O	O	O
CALCIUM	E	E	E	E	E	E	E	E	E	E
CHROMIUM	X	O	X	O	O	O	O	X	O	O
COBALT	E	E	E	E	E	E	E	E	E	E
COPPER	E	E	E	E	E	O	E	O	O	O
CYANIDE	X	O	O	O	O	O	O	O	O	O
IRON	E	O	E	E	E	O	E	O	X	O
LEAD	X	O	X	E	E	E	E	E	E	E
MAGNESIUM	E	E	E	E	E	E	E	E	E	E
MANGANESE	E	E	E	E	E	E	E	E	E	E
MERCURY	X	O	O	O	O	O	X	O	O	O
NICKEL	E	E	E	E	O	E	O	E	O	O
POTASSIUM	E	E	E	O	O	O	O	E	E	E
SELENIUM	O	O	O	O	O	O	O	X	O	O
SILVER	X	O	O	O	O	O	O	O	O	O
SODIUM	E	E	E	E	E	E	E	O	O	O
STRONTIUM	X	X	X	O	X	X	O	O	O	O
THALLIUM	O	O	O	O	O	O	O	O	O	O
VANADIUM	X	O	O	O	O	O	O	O	O	O
ZINC	E	E	E	E	E	E	E	E	E	E

X = Selected as chemical of potential concern.

O = Not selected; within background levels.

) = Not selected; blank contaminant.

- = Not detected.

E = Essential nutrient used as basis for removal in accordance with USEPA Region V specifications (USEPA 1991e).

G.M.R. = Great Miami River

TABLE 16  
ORAL TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

Chemical	Slope Factor (SF) (mg/kg-day) <sup>-1</sup>	Weight- of-Evidence Classification	Slope Factor Source	Chronic RfD (mg/kg-day)	Target Organ	RfD Source	Uncertainty Factor
ORAL							
Organic Chemicals:							
Acenaphthene	---	0	IRIS	6.00E-02	liver	IRIS	3,000
Acetone	---	0	IRIS	1.00E-01	kidney/liv	IRIS	1,000
Anthracene	---	0	IRIS	3.00E-01	none osser	IRIS	3,000
Benzo(a)anthracene	---	(a) 82	IRIS	---	---	---	---
Benzene	2.90E-02	A	IRIS	---	---	IRIS	---
Benzo(a)pyrene	1.15E+01	82	HEAST	---	---	---	---
Benzo(b)fluoranthene	---	(a) 82	IRIS	---	---	---	---
Benzo(g,h,i)perylene	---	0	IRIS	---	(a) ---	---	---
Benzo(k)fluoranthene	---	(a) 82	IRIS	---	---	---	---
Benzoic acid	---	0	IRIS	4.00E+00	metabol	IRIS	1
Benzyl alcohol	---	---	---	3.00E-01	forestomac	HEAST	1,000
2-Butanone (methyl ethyl ketone)	---	0	IRIS	5.00E-02 (b,c)	Fetotox	IRIS	1,000
Butylbenzylphthalate	---	C	IRIS	2.00E-01	liver/brain	IRIS	1,000
Carbon Disulfide	---	---	---	1.00E-01 (c)	fetotox	IRIS	100
4-Chloro-3-methylphenol (4-Chloro-m-cresol)	---	---	---	---	---	HEAST	---
Chlorobenzene	---	0	IRIS	2.00E-02	liver	IRIS	1,000
Chloroethane	---	---	---	---	---	---	---
Chloroform	6.10E-03	82	IRIS	1.00E-02	Liver	IRIS	1,000
Chrysene	---	(a) 82	IRIS	---	---	HEAST	---
DDT	3.40E-01	82	IRIS	5.00E-04 (d)	liver tes	IRIS	100
Di-n-butylphthalate	---	---	---	1.00E-01	mortality	IRIS	1,000
Di-n-octyl phthalate	---	---	---	2.00E-02 (e)	liver,kidn	HEAST	1,000
Dibenzo(a,h)anthracene	---	(a) 82	IRIS	---	---	---	---
Dibenzofuran	---	0	IRIS	---	(a) ---	HEAST	---
1,2-Dichlorobenzene	---	0	IRIS	9.00E-02	liver	IRIS	1,000
1,4-Dichlorobenzene	2.40E-02 (f)	C	HEAST	1.00E-01	kidney	HA	1,000
3,3'-Dichlorobenzidine	4.50E-01	82	IRIS	---	---	---	---
1,1-Dichloroethane	---	C	IRIS	1.00E-01 (e)	kidney	HEAST	1,000
cis-1,2-Dichloroethane	---	0	IRIS	1.00E-02	hematol	HEAST	3,000
trans-1,2-Dichloroethane	---	---	---	2.00E-02	liver	IRIS	1,000
Dichloropropanes (1,1-, 1,2-, 1,3-, 2,2-)	---	---	---	---	---	HEAST	---
1,2-Dichloropropane	6.80E-02 (f)	82	HEAST	---	---	HEAST	---
1,3-Dichloropropane	1.80E-01	82	HEAST	---	---	---	---
trans-1,3-Dichloropropane	---	---	---	3.00E-04	kidney	IRIS	10,000
Diethylphthalate	---	0	IRIS	8.00E-01	body wt.	IRIS	1,000
2,4-Dimethylphenol	---	---	---	2.00E-02	neuro/hema	IRIS	3,000
Ethylbenzene	---	0	IRIS	1.00E-01	liver,kidn	IRIS	1,000
bis(2-Ethylhexyl)phthalate	1.40E-02	82	IRIS	2.00E-02	liver	IRIS	1,000
Fluoranthene	---	---	---	4.00E-02	kidn/liver	IRIS	3,000
Fluorene	---	0	IRIS	4.00E-02	hematol	IRIS	3,000
2-Hexanone	---	---	---	---	---	HEAST	---
Indene(1,2,3-c,d)pyrene	---	(a) 82	IRIS	---	---	---	---
Isophorone	4.10E-03	C	IRIS	2.00E-01	kidney	IRIS	1,000
4-Methyl,2-pentanone (MIBK)	---	---	---	5.00E-02	liver/kidney	HEAST	1,000
2-Methylnaphthalene	---	---	---	---	(a) ---	---	---
2-Methylphenol (o-cresol)	---	---	---	5.00E-02	neurotox	IRIS	1,000
4-Methylphenol (p-cresol)	---	---	---	5.00E-02	neurotox	IRIS	1,000
N-Nitrosodiphenylamine	4.90E-03	82	IRIS	---	---	---	---
Naphthalene	---	0	IRIS	4.00E-03 (f)	<body wt	HEAST	10,000
Nitrobenzene	---	---	---	5.00E-04 (b,c)	liver/kidn	IRIS	10,000
PCBs (total)	7.70E+00 (l)	82	IRIS	1.00E-04 (m)	fetotox	Clemm	100
Pentachlorophenol	1.20E-01	82	IRIS	3.00E-02	liv/kid	IRIS	100
Phenanthrene	---	0	IRIS	---	(a) ---	HEAST	---
Phenol	---	0	IRIS	6.00E-01	fetal wt	IRIS	100

TABLE 16 (continued)

## ORAL TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

Chemical	Slope Factor (SF) (mg/kg-day) <sup>-1</sup>	Weight-of-Evidence Classification	Slope Factor Source	Chronic RfD (mg/kg-day)	Target Organ	RfD Source	Uncertainty Factor
Pyrene	---	0	IRIS	3.00E-02	kidney	IRIS	3,000
Styrene	3.00E-02 (f)	82	HEAST	2.00E-01	RBC/liver	IRIS	1,000
Tetrachloroethene (perchloroethylene)	5.10E-02 (g)	82	HEAST	1.00E-02	liver	IRIS	1,000
Toluene	---	0	IRIS	2.00E-01	Liver, kidney	IRIS	1,000
1,1,1-Trichloroethane	---	0	IRIS	9.00E-02 (b,c)	liver	IRIS	1,000
Trichloroethene	1.10E-02	82	HEAST	7.35E-03	liver	HA	1,000
Vinyl Chloride	1.90E+00	A	HEAST	---	---	---	---
xylene (total)	---	0	IRIS	2.00E+00	CNS, mortal	IRIS	100
<b>Inorganic Chemicals:</b>							
Aluminum	---	---	---	---	---	HEAST	1
Antimony	---	---	---	4.00E-04	blood chem.	HEAST	1,000
Arsenic	2.00E+00 (h)	A	IRIS	1.00E-03 (e)	skin	HEAST	1
Barium	---	---	---	7.00E-02	inc SP	IRIS	3
Beryllium	4.30E+00	82	IRIS	5.00E-03	total tumor	IRIS	100
Cadmium (water)	(j)	---	IRIS	5.00E-04	kidney	IRIS	10
Cadmium (food)	---	---	---	1.00E-03	kidney	IRIS	10
Chromium III and Compounds	---	---	---	1.00E+00	liver	IRIS	1,000
Chromium VI and Compounds	(j)	---	IRIS	5.00E-03	CNS	IRIS	500
Cyanide	---	---	---	2.00E-02	myelin deg	IRIS	500
Lead	---	82	IRIS	---	CNS	IRIS	---
Mercury	---	0	IRIS	3.00E-04	kidney	HEAST	1,000
Silver	---	---	---	3.00E-03	argyria	IRIS	2
Strontium	---	---	---	---	---	---	---
Thallium and compounds	---	0	IRIS	7.00E-05 (k)	Serum, blood	HEAST	3,000
Vanadium	---	---	---	7.00E-03 (e)	liver, kidney	HEAST	100

-- = No data available.

\* = mg/L

- (a) No oral toxicity data are available for these PAH's. However, a surrogate value (for carcinogens equal to that of benzo(a)pyrene; for noncarcinogens equal to that of naphthalene) has been assigned.
- (b) Based on route to route extrapolation.
- (c) Being reconsidered by oral RfD workgroup.
- (d) Value is for 4,4'-DDT.
- (e) Under review by RfD/RfC workgroup.
- (f) Under review by CRAVE Workgroup.
- (g) Quantitative estimates were not calculated by CRAVE Workgroup.
- (h) A unit risk of 5E-05 (ug/L)<sup>-1</sup> has been proposed by the risk assessment forum and this recommendation has been scheduled for SAB review. This is equivalent to 1.75 (mg/kg-day)<sup>-1</sup> assuming a 70 kg individual ingest 2 L of water per day. This is rounded to two significant figures due to uncertainty.
- (i) Value is derived from current drinking water standard of 1.3 mg/L; drinking water document concluded toxicity information were inadequate for calculation of an RfD for copper. This is equivalent to 3.71E-02 mg/kg-day assuming a 70 kg individual drinks 2 L/day. This rounds to 4.0E-02 due to uncertainty.
- (j) There is inadequate evidence for carcinogenicity of this compound by the oral route.
- (k) Value is thallium in soluble salts.
- (l) Based on Aroclor 1260.
- (m) Derived by Clement. Based on Aroclor 1016.

NOTE: IRIS = Integrated Risk Information System - March 1, 1991.  
 HEAST = Health Effects Assessment Summary Tables - 1991.  
 HA = Health Advisory - March 1987.

TABLE 17

## INHALATION TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

Chemical	Unit Risk (UR) (ug/m <sup>3</sup> )-1	Weight- of-Evidence Classification	Unit Risk Source	Chronic RfC (mg/m <sup>3</sup> )	Target Organ	RfC Source	Uncertain Factor
<b>INHALATION</b>							
<b>Organic Chemicals:</b>							
Acenaphthene	---	0	IRIS	---	---	IRIS	---
Acetone	---	0	IRIS	---	---	IRIS	---
Anthracene	---	0	IRIS	---	---	IRIS	---
Benzene	8.30E-06	A	IRIS	---	---	IRIS	---
Benzo(a)anthracene	---	B2	IRIS	---	---	---	---
Benzo(a)pyrene	1.70E-03	B2	HEAST	---	---	---	---
Benzo(b)fluoranthene	---	B2	IRIS	---	---	---	---
Benzo(g,h,i)perylene	---	0	IRIS	---	---	---	---
Benzo(k)fluoranthene	---	B2	IRIS	---	---	---	---
Benzoic acid	---	0	IRIS	---	---	IRIS	---
Benzyl alcohol	---	---	---	---	---	HEAST	---
2-Butanone (methyl ethyl ketone)	---	---	---	3.00E-01	CNS	HEAST	1,000
Butylbenzylphthalate	---	---	IRIS	---	---	IRIS	---
Carbon Disulfide	---	---	---	1.00E-02	fetotox	HEAST	1,000
4-Chloro-3-methylphenol	---	---	---	---	---	---	---
Chlorobenzene	---	0	IRIS	2.00E-02	kid/liver	HEAST	10,000
Chloroethane	---	---	---	---	---	---	---
Chloroform	2.30E-05	B2	IRIS	---	---	IRIS	---
Chrysene	---	B2	IRIS	---	---	HEAST	---
DDT	9.70E-05	B2	IRIS	---	(a)	IRIS	---
Di-n-octyl phthalate	---	---	---	---	---	HEAST	---
Dibenzo(a,h)anthracene	---	B2	IRIS	---	---	---	---
Dibenzofuran	---	0	IRIS	---	---	HEAST	---
1,2-Dichlorobenzene	---	0	HEAST	2.00E-01	body wt	HEAST	1,000
1,4-Dichlorobenzene	---	C	HEAST	7.00E-01	liv/kid	HEAST	100
1,3'-Dichlorobenzidine	---	B2	IRIS	---	---	---	---
1,1-Dichloroethane	---	C	IRIS	5.00E-01	kidney	HEAST	1,000
cis-1,2-Dichloroethene	---	0	IRIS	---	---	HEAST	---
trans-1,2-Dichloroethene	---	---	---	---	---	IRIS	---
Dichloropropanes	---	---	---	---	---	HEAST	---
(1,1-, 1,2-, 1,3-, 2,2-)	---	---	---	---	---	---	---
1,2-Dichloropropane	---	B2	HEAST	---	---	---	---
1,3-Dichloropropane	3.70E-05	B2	HEAST	---	---	---	---
trans-1,3-Dichloropropane	---	---	---	2.00E-02	nasal muc	IRIS	30
Diethylphthalate	---	0	IRIS	---	---	IRIS	---
2,4-Dimethylphenol	---	---	---	---	---	IRIS	---
Ethylbenzene	---	0	IRIS	1.00E+00	development	IRIS	300
bis(2-Ethylhexyl)phthalate	---	B2	IRIS	---	---	IRIS	---
Fluoranthene	---	---	---	---	---	IRIS	---
Fluorene	---	0	IRIS	---	---	IRIS	---
2-Hexanone	---	---	---	---	---	HEAST	---
Indeno(1,2,3-c,d)pyrene	---	B2	IRIS	---	---	---	---
Isophorone	---	C	IRIS	---	---	IRIS	---
4-Methyl,2-pentanone (MIBK)	---	---	---	8.00E-02	liv/kid	HEAST	1,000
2-Methylnaphthalene	---	---	---	---	---	---	---
2-Methylphenol (o-cresol)	---	---	---	---	---	IRIS	---
4-Methylphenol (p-cresol)	---	---	---	---	---	IRIS	---
Methyl Ethyl Ketone (2-butanone)	---	0	IRIS	---	---	---	---
N-Nitrosodiphenylamine	---	B2	IRIS	---	---	---	---
Naphthalene	---	0	IRIS	---	---	HEAST	---
Nitrobenzene	---	---	---	2.00E-03	liver/kidn	HEAST	3,000
PCBs (total)	---	---	---	---	---	IRIS	---
Pentachloroanisol	---	B2	HEAST	---	---	IRIS	---
Phenanthrene	---	0	IRIS	---	---	HEAST	---
Phenol	---	0	IRIS	---	---	IRIS	---
Pyrene	---	0	IRIS	---	---	IRIS	---
Styrene	5.70E-07 (b)	B2	HEAST	---	---	IRIS	---
Tetrachloroethene	5.20E-07 (c)	B2	HEAST	---	---	IRIS	---
(perchloroethylene)	---	---	---	---	---	---	---
Toluene	---	0	IRIS	2.00E+00	CNS, irrit	HEAST	100
1,1,1-Trichloroethane	---	0	IRIS	1.00E+00	liver	HEAST	1,000
Trichloroethene	1.70E-06 (d)	B2	HEAST	---	---	IRIS	---
vinyl Chloride	8.40E-05	A	HEAST	---	---	---	---
xylene (total)	---	0	IRIS	3.00E-01	CNS, resp	HEAST	100



TABLE 17 (continued)

## INHALATION TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

Chemical	Unit Risk (UR) (ug/m <sup>3</sup> )-1	Weight- of-Evidence Classification	Unit Risk Source	Chronic RfC (mg/m <sup>3</sup> )	Target Organ	RfC Source	Uncertainty Factor
<b>Inorganic Chemicals:</b>							
Aluminum	---	---	---	---	---	HEAST	---
Antimony	---	---	---	---	Cancer	IRIS	---
Arsenic	4.30E-03 (e)	A	IRIS	---	Cancer	IRIS	---
Barium	---	---	---	5.00E-04	Fetotox	HEAST	1,000
Beryllium	2.40E-03	B2	IRIS	---	---	IRIS	---
Cadmium	1.80E-03	B1	IRIS	---	---	IRIS	---
Chromium III and Compounds	---	---	---	2.00E-06	Nasal Muc	HEAST	300
Chromium VI and Compounds	1.20E-02	A	IRIS	2.00E-06	Nasal Muc	HEAST	300
Cyanide	---	---	---	---	---	IRIS	---
Lead	---	B2	IRIS	---	CNS	IRIS	---
Mercury, inorganic	---	---	---	3.00E-04	Neurotox	HEAST	---
Silver	---	---	---	---	---	IRIS	---
Strontium	---	---	---	---	---	---	---
Thallium and compounds	---	D	IRIS	---	---	HEAST	---
Vanadium	---	---	---	---	---	HEAST	---

--- = No data available.

\* = mg/L

(a) Based on 4,4-DDT.

(b) Under review by CRAVE Workgroup.

(c) Quantitative estimates were not calculated by CRAVE Workgroup.

(d) Based on metabolized dose.

(e) An absorption factor of 30% is used to calculate the unit risk from the slope factor.

(f) Based on thallium in soluble salts.

IRIS = Integrated Risk Information System - March 1, 1991.

HEAST = Health Effects Assessment Summary Tables - 1991.

TABLE 18

COMPARISON OF CHEMICAL CONCENTRATIONS FOR CHEMICALS OF POTENTIAL CONCERN DETECTED AT THE POWELL ROAD LANDFILL  
TO FEDERAL MAXIMUM CONTAMINANT LEVELS  
(Concentrations reported in µg/L)

Chemical	Eldorado Plat Monitoring Wells		On-Site Monitoring Wells		Federal Maximum Contaminant Levels
	Arithmetic Mean	Maximum Detected Concentrations	Arithmetic Mean	Maximum Detected Concentrations	
Organics:					
Acetone	40	40	5	8.5	--
Benzene	40	40	2.5	2.7	5 (a)
Benzoic acid	40	40	26	4	--
2-Butanone	40	40	1.5	2.5	--
Carbon Disulfide	40	40	2.5	2.7	--
Chlorobenzene	40	40	2.5	4	100 (b)
Chloroethane	40	40	7.3	43.3	--
1,1-Dichloroethane	40	40	12	104	--
1,2-Dichloroethene (total)	2.7	3.8	5	47.8	70 (b) (c), (d)
Diis(2-Ethylhexyl)phthalate	3	3	4.2	3.5	1 (P, c)
Tetrachloroethene	40	40	2.4	2.2	5 (b)
1,1,1-Trichloroethane	40	40	3.4	23.3	100 (a)
Vinyl Chloride	40	40	5.4	10.8	5 (a)
Vinyls (total)	40	40	0.7	1	10,000 (b)
1,1-Dichloroethene	3	5.3	40	40	5 (a)
Inorganics					
Aluminum	24	23.7	50	73	50 - 200 (b, d)
Beryllium	--	--	1.8	2.4	1 (P, c)
Chromium	--	--	6.8	11.5	100 (b)
Lead	2.4	2.7	3.5	24.3	50 (a, e)
Silver	--	--	4.6	4.6	15 (AL, f)

-- = Not available.

ND = Not detected in samples.

(P) Proposed.

AL = Action Level.

(a) 40 CFR, Part 141-National Primary Drinking Water Regulations. 559-563, 620-621.

(b) Environmental Protection Agency (EPA). 1991. National Primary Drinking Water Regulations; Final Rule. Federal Register. Vol. 56, No. 20, Wednesday, January 30, 1991. 3526-3597.

(c) Environmental Protection Agency (EPA) 1990. National Primary and Secondary Drinking Water Regulations; Synthetic Organic Chemicals and Inorganic Chemicals. Proposed Rule. Federal Register. Vol. 55, No. 143, Wed. July 25, 1990.

(d) Secondary MCL.

(e) The MCL for lead is in effect until December 7, 1992 when the Action Level will take its place.

(f) Environmental Protection Agency (EPA). 1991. Drinking Water Regulations; Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper; Final Rule. Federal Register; Vol. 56, No. 110, 26460-26566, Friday, June 7, 1991. Standards will go into effect December 7, 1992.

**TABLE 19**  
**SUMMARY OF POTENTIAL HEALTH RISKS ASSOCIATED WITH**  
**CURRENT LAND USE CONDITIONS**

**POWELL ROAD LANDFILL**  
**HUDER HEIGHTS, OHIO**

Receptor Population/Exposure Pathway	Upper Bound Excess Lifetime Cancer Risk (a)	Hazard Index for Noncarcinogenic Effects (b)	
<b>Child/Teenager (Trespasser/Resident):</b>			
Incidental Ingestion of Onsite Surface Soil	3E-07	<1	3E-03
Dermal Contact with Onsite Surface Soil	2E-09	<1	1E-04
Inhalation of Landfill VOC Emissions (c)	2E-07	<1	1E-03
Incidental Ingestion of Stream A Sediment	NC	<1	8E-05
Incidental Ingestion of Great Miami River Sediment	7E-08	<1	1E-05
Dermal Contact with Stream A Surface Water	9E-07	<1	8E-04
Incidental Ingestion of Great Miami River Surface Water	4E-07	<1	4E-04
Dermal Contact with Great Miami River Surface Water (d)	2E-05	<1	2E-01
<b>Total Exposure Through All Pathways Above (e)</b>	<b>2E-05</b>	<b>&lt;1</b>	<b>2E-01</b>
<b>Adult (Trespasser/Resident)</b>			
Incidental Ingestion of Onsite Surface Soil	3E-07	<1	8E-04
Dermal Contact with Onsite Surface Soil	5E-09	<1	7E-05
Inhalation of Landfill VOC Emissions (while trespassing)	3E-07	<1	5E-04
Incidental Ingestion of Stream A Sediment	NC	<1	2E-05
Incidental Ingestion of Great Miami River Sediment	6E-08	<1	3E-06
Dermal Contact with Stream A Surface Water	1E-06	<1	4E-04
Incidental Ingestion of Great Miami River Surface Water	3E-07	<1	1E-04
Dermal Contact with Great Miami River Surface Water (d)	3E-05	<1	1E-01
<b>Total Exposure Through All Pathways Above (e)</b>	<b>4E-05</b>	<b>&lt;1</b>	<b>1E-01</b>

**TABLE 19 (continued)**  
**SUMMARY OF POTENTIAL HEALTH RISKS ASSOCIATED WITH**  
**CURRENT LAND USE CONDITIONS**

**POWELL ROAD LANDFILL**  
**HUBER HEIGHTS, OHIO**

Receptor Population/Exposure Pathway	Upper Bound Excess Lifetime Cancer Risk (a)	Hazard Index for Noncarcinogenic Effects (b)	
Nearby Resident (Eldorado Flat)			
Ingestion of Ground Water from Residential Wells	NC <sup>c</sup>	<1	4E-04
Ingestion of Ground Water from Monitoring Wells	7E-07	<1	3E-02
Inhalation of VOCs While Showering Using Monitoring Wells	2E-05	NC	NC
Dermal Contact with Ground Water While Showering Using Residential Wells	NC	<1	4E-06
Dermal Contact with Ground Water While Showering Using Monitoring Wells	2E-08	<1	7E-04
Ingestion of Fish from Great Miami River Backwater Area (d)	2E-03	>1	6E+00
Inhalation of Landfill VOC Emissions (c)	7E-06	<1	1E-02
Total Exposure From All Residential Well Pathways Above (e)	2E-03	>1	6E+00
Total Exposure From All Monitoring Well Pathways Above (e)	2E-03	>1	6E+00

- (a) The upper bound individual excess lifetime cancer risk represents the additional probability that an individual may develop cancer over a 70 year lifetime as a result of exposure conditions evaluated.
- (b) The hazard index indicated whether or not exposure to mixtures of noncarcinogenic chemicals may result in adverse health effects. A hazard index less than one indicates that human health effects are unlikely to occur.
- (c) The listed risk is an upper bound, particularly due to the conservative landfill emissions model used; it may be overestimated by as much as four orders of magnitude.
- (d) The cancer risk is primarily due to Aroclors 1016 and 1254 (PCBs), and, although both Aroclors are likely to be far less carcinogenic than Aroclor 1260, if at all, both were evaluated using the slope factor for Aroclor 1260.
- (e) It is highly unlikely that a single individual would be simultaneously exposed through all of these pathways. In fact, there are numerous possible combinations of potential exposure pathways that could be considered for the site. However, cumulative risks across pathways were presented as shown above in accordance with HSEPA Region V/DEPA (1991) comments on the Draft Baseline Risk Assessment (Clement 1991b).

NC - Not Calculated. Chemicals associated with either carcinogenic or noncarcinogenic effects were not selected for evaluation through the listed pathway, or were not detected.

Source - Section 6 of the Remedial Investigation

TABLE 20

SUMMARY OF POTENTIAL HEALTH RISKS ASSOCIATED WITH  
FUTURE LAND USE CONDITIONSPOWELL ROAD LANDFILL  
HUBER HEIGHTS, OHIO

Receptor Population/Exposure Pathway	Upper Bound Excess Lifetime Cancer Risk (a)	Hazard Index for Noncarcinogenic Effects (b)	
Hypothetical Onsite Resident			
Incidental Ingestion of Onsite Surface Soil (c)	2E-05	<1	5E-02
Dermal Contact with Onsite Surface Soil	4E-08	<1	5E-04
Inhalation of Landfill VOC Emissions (d)	2E-05	<1	4E-02
Ingestion of Onsite Ground Water	7E-05	>1	3E+00
Inhalation of VOCs While Showering Using Onsite Ground Water	2E-07	<1	2E-02
Dermal Contact with Onsite Ground Water While Showering	3E-06	<1	5E-02
Total Exposure Through All Pathways Above (e)	1E-04	>1	3E+00

- (a) The upper bound individual excess lifetime cancer risk represents the additional probability that an individual may develop cancer over a 70 year lifetime as a result of exposure conditions evaluated.
- (b) The hazard index indicates whether or not exposure to mixtures of noncarcinogenic chemicals may result in adverse health effects. A hazard index less than one indicates that human health effects are unlikely to occur.
- (c) The cancer risk is due primarily to carcinogenic PAHs, which were conservatively evaluated using only the slope factor for benzo(a)pyrene, one of the most potent PAHs.
- (d) The listed risk is an upper bound, particularly due to the conservative landfill emissions model used; it may be overestimated by as much as four orders of magnitude.
- (e) It is highly unlikely that a single individual would be simultaneously exposed through all of these pathways. In fact, there are numerous possible combinations of potential exposure pathways that could be considered for the site. However, cumulative risks across pathways were presented as shown above in accordance with USEPA Region V/DEPA (1991) comments on the Draft Baseline Risk Assessment (Clement 1991b).

Source - Section 6 of the Remedial Investigation

TABLE 21

## SUMMARY OF RISK-BASED CLEANUP LEVELS

POWELL ROAD LANDFILL  
HUDER HEIGHTS, OHIO

Remedial Action Objective	Reference Calculation Table	Chemical of Concern	Water (mg/L)			Soil (mg/kg)		Air (ug/L)	
			H=1	10-6 Risk	10-4 Risk	10-6 Risk	10-4 Risk	10-6 Risk	10-4 Risk
Current Land Use Conditions									
• Nearby residents from inhalation of landfill gas emission	Exhibit 1	Vinyl chloride						0.012	1.2
• Nearby residents from dermal contact with the backwaters of the Great Miami River*	Exhibit 2	Beryllium				0.1	10		
		4,4'-DDT				2	200		
		Anchor 1016				0.3-0.6	35-61		
		Anchor 1254				0.1-0.4	36-59		
• Nearby residents from dermal contact to Stream A surface water*	Exhibit 2	Beryllium				0.1	10		
		4,4'-DDT				2	200		
		Anchor 1016				0.3-0.6	35-61		
		Anchor 1254				0.1-0.4	36-59		
• Nearby residents from ingestion of fish caught from the backwater area of the Great Miami River*	Exhibit 2	Beryllium				0.1	10		
		4,4'-DDT				2	200		
		Anchor 1016				0.3-0.6	35-61		
		Anchor 1254				0.1-0.4	36-59		
• Nearby residents from inhalation of volatiles from ground water	Exhibit 3	Trichloroethene		0.25	25				
Future Land Use Conditions									
• Onsite residents from ingestion of soil	Exhibit 4	Benzo(a)pyrene				0.05	5		
		Benzo(1)anthracene				0.05	5		
		Benzo(b)fluoranthene				0.05	5		
		Benzo(k)fluoranthene				0.05	5		
		Chrysene				0.05	5		
		Dibenzo(a,h)anthracene				0.05	5		
		Indeno(1,2,3-cd)pyrene				0.05	5		
• Onsite residents from inhalation of landfill gas emissions	Exhibit 5	Vinyl chloride						0.012	1.2
		Benzene						0.12	12

TABLE 21 (continued)

SUMMARY OF RISK-BASED CLEANUP LEVELS  
(Continued)

Remedial Action Objective	Reference Calculation Table	Chemical of Concern	Water (mg/L)			Soil (mg/kg)		Air (µg/L)	
			H1=1	10 <sup>-6</sup> Risk	10 <sup>-4</sup> Risk	10 <sup>-6</sup> Risk	10 <sup>-4</sup> Risk	10 <sup>-6</sup> Risk	10 <sup>-4</sup> Risk
• Onsite residents from ingestion of ground water**	Exhibit 6	Arsenic	0.015						
		Benzo(a)anthracene		0.0000017	0.00017				
		Chrysene		0.0000017	0.00017				
		Vinyl chloride		0.00004	0.004				
		Arsenic		0.00004	0.004				
• Onsite residents from dermal contact with ground water**	***	Beryllium		0.00012	0.012				
		Chrysene							

\* Soil cleanup levels provided due to potential surface water contaminant sources being isolated areas of soils and no current use surface water contamination having been detected during the RI sampling.

\*\* Future land use risks from ground water based on exposure to leachate constituents

\*\*\* Cleanup levels specific for this pathway are not calculated because (1) dermal exposure guidance is not yet available from the U.S. EPA and (2) ground water will be remediated based on risks associated with ingestion of ground water.

TABLE 22  
 CHEMICAL-SPECIFIC APPLICABLE OR  
 RELEVANT AND APPROPRIATE REQUIREMENTS  
 POWELL ROAD LANDFILL  
 HUBER HEIGHTS, OHIO

Water	Organic Chemical		
	SDWA MCL (mg/L)	RCRA MCL (mg/L)	
Aroclor 1016	0.0005	0	NA
Aroclor 1254	0.0005	0	NA
Benzene	0.005	0	0.005
Benz(a)anthracene	0.0001	0	NA
Benz(b)fluoranthene	0.0002	0	NA
Benz(k)fluoranthene	0.0002	0	NA
Benz(a)pyrene	0.0002	0	NA
Chrysene	0.0002	0	NA
4,4'-DDT	NA	NA	NA
Dibenz(a,h)anthracene	0.0003	0	NA
Indeno(1,2,3-cd)pyrene	0.0004	0	NA
Trichlorobenzene	0.0005	0	0.005
Vinyl chloride	0.0002	0	0.002
Inorganic Chemical			
Ammony	0.01/0.005	0.003(b)	NA
Arsenic	0.05	0	0.05
Beryllium	0.0001	0	NA
Mercury	0.0002	0	0.002

Only non zero MCLGs under the SDWA are potentially ARAR.



TABLE 23

**STATE OF OHIO: SURFACE WATER STANDARDS  
FOR THE POWELL ROAD LANDFILL  
HUBER HEIGHTS, OHIO**

Chemical	Use Designations					
	Aquatic Life Habitat (Warm Water Habitat) (ug/L)			Water Supply (ug/L)		
	Outside Mixing Zone		Human Health	Inside Mixing Zone	Public Water	Agricultural Water
	30-Day	30-Day	30-Day	Zone	Water	Water
	Maximum	Average	Average	Maximum	Supply <sup>a</sup>	Supply <sup>b</sup>
<i>Organic Chemical</i>						
Aroclor 1016	NA	0.001	0.00079	NA	0	NA
Aroclor 1254	NA	0.001	0.00079	NA	0	NA
Benzene	1,100	560	710	2,100	5	NA
Benzo(a)anthracene	NA	NA	0.31	NA	0.028	NA
Benzo(b)fluoranthene	NA	NA	0.31	NA	0.028	NA
Benzo(k)fluoranthene	NA	NA	0.31	NA	0.028	NA
Benzo(a)pyrene	NA	NA	0.31	NA	0.028	NA
Chrysene	NA	NA	0.31	NA	0.028	NA
4,4'-DDT	NA	0.001	0.00024	NA	0.00024	NA
Dibenzo(a,h)anthracene	NA	NA	0.31	NA	0.028	NA
Indeno(1,2,3-cd)pyrene	NA	NA	0.31	NA	0.028	NA
Trichloroethene	1,700	75	807	3,400	5.0	NA
Vinyl chloride	NA	NA	5,250	NA	2.0	NA
<i>Inorganic Chemical</i>						
Antimony	650	190	4,300	1,300	14	NA
Arsenic	360	190	NA	720	50	100
Beryllium	c	c	1.17	c	0.068	100

<sup>a</sup> Values presented are based on human health 30-day average.

<sup>b</sup> Values presented are based on 30-day average.

<sup>c</sup> Values can be estimated based on water hardness and Tables 7-10, 7-11, and 7-12 of Water Quality Standards. Ohio EPA Regulations OAC 3745-1-22.

**TABLE 24**  
**STATE OF OHIO**  
**LOCATION-SPECIFIC ARARs**  
**POWELL ROAD LANDFILL**  
**HUBER HEIGHTS, OHIO**

Location	Requirement	Citation
Restricted areas for open burning	Open burning prohibited without OEPA permission.	OAC 3745-19-03 A, B, C, D
Floodplains, sand or gravel pits, wetlands, areas above sole source aquifers	New solid waste landfills or expansion of existing solid waste landfills prevented in areas noted.	OAC 3745-27-07 A, B
Putrescible waste disposal sites	Explosion gas monitoring plan.	OAC 3745-27-12 B, E
Areas of seismic activity and floodplains	Restricted siting of hazardous waste TSDF.	OAC 3745-34-18 A, B, C
Location, siting of new ground water wells	New wells must be located and maintained to prevent contaminants from entering and be accessible for cleaning and maintenance.	OAC 3745-9-04 A, B

TABLE 25

STATE OF OHIO  
ACTION-SPECIFIC ARARsPOWELL ROAD LANDFILL  
MURER HEIGHTS, OHIO

Actions	Requirement	Citation
Air Shipping	Malfunction and maintenance, air pollution control equipment.	OAC 3745-15-06
	Air pollution nuisance prohibited.	OAC 3745-15-07, A
	Good engineering stack height required.	OAC 3745-16-02, B, C
	Organic matter emission control from stationary sources (best available control technology).	OAC 3745-21-07, A, B, I
	Air and water permit criteria ambient air quality standard and best available technology.	OAC 3745-31-05
	Inspection requirements for hazardous waste facilities.	OAC 3745-54-15, A - C <sup>(a)</sup>
	Design and operation of hazardous waste facilities.	OAC 3745-54-31 <sup>(a)</sup>
	Emergency equipment; communication, alarm, local authority arrangements, contingency plan contents, emergency coordinator, emergency procedures, plan amendments.	OAC 3745-54-32, A, B, C, D OAC 3745-54-33 OAC 3745-54-34 OAC 3745-54-37, A OAC 3745-54-52, A-F OAC 3745-54-55 OAC 3745-54-56, A, F <sup>(a)</sup>
	Cannot degrade air quality where existing quality is equal to or greater than specified in OAC 3745-17-02.	OAC 3745-17-05
	Visible emissions and nuisance.	OAC 3745-17-07
	Restrictions on particulate emissions from fuel burning equipment.	OAC 3745-17-10
	Ambient air quality standards for particulates.	OAC 3745-17-02
	Ambient air quality standards for sulfur dioxide.	OAC 3745-18-02

TABLE 25 (continued)

Actions	Requirement	Citation
Air Stripping (Cont'd)	Methods for determining compliance with allowable sulfur dioxide emissions.	OAC 3745-18-04
	Sulfur dioxide ambient monitoring requirements.	OAC 3745-18-05, A
	Sulfur dioxide emission limit provisions.	OAC 3745-18-06, A - G
	Open burning standards in non-protected areas.	OAC 3745-19-04, A - D
	Ambient air quality standards and guidelines for carbon monoxide, ozone, and non-methane hydrocarbons.	OAC 3745-21-02
	Cannot degrade air quality where existing quality is equal to or greater than specified in OAC 3745-21-02.	OAC 3745-21-05
	Control of emissions of carbon monoxide from stationary sources.	OAC 3745-21-08
	Ambient air quality standards for nitrogen dioxide.	OAC 3745-23-01
	Methods for measurement of nitrogen dioxide.	OAC 3745-23-02
	Cannot degrade air quality where existing quality is equal to or greater than specified in OAC 3745-23-01.	OAC 3745-23-04
	Nitrogen dioxide emission control: stationary sources.	OAC 3745-23-06
Leachate Removal	Emission control program if emit 0.25 ton per day or more of air contaminants for which air quality standards had been adopted.	OAC 3745-25-03
	Provides authority to prosecute for violations of any section of Chapter 3734.	ORC 3734.10
	Conservancy district rules and regulations pertaining to channels, ditches, pipes, sewers, etc.	ORC 6101.19
	Air pollution nuisance prohibited.	OAC 3745-15-07, A
	VOC emission control, stationary sources.	OAC 3745-21-09 OAC 3745-21-02

TABLE 25 (continued)

Actions	Requirement	Citation
<b>Leachate Removal (Cont'd)</b>	<b>Additional permit information and hazardous waste storage in tanks.</b>	OAC 3745-50-44, A, C <sup>(a)</sup>
	<b>Emergency equipment; communication, alarm, local authority arrangements, contingency plan contents, emergency coordinator, emergency procedures, and plan amendments.</b>	OAC 3745-54-32, A, B, C, D OAC 3745-54-33 OAC 3745-54-34 OAC 3745-54-37, A OAC 3745-54-52, A-F OAC 3745-54-55 OAC 3745-54-56, A <sup>(a)</sup>
	<b>Design of tank systems, components, containment, leak detection, operating requirements, inspections, response to spills or leaks, closure and post-closure.</b>	OAC 3745-55-92, A-F OAC 3745-55-93, A-G, I OAC 3745-55-94, A, B, C OAC 3745-55-95, A-D OAC 3745-55-96, A, B, C, D, E, F OAC 3745-55-97, A, B <sup>(a)</sup>
	<b>Disposal/decontamination of equipment, structures, and soils.</b>	OAC 3745-55-14 <sup>(a)</sup>
	<b>Requirements for leachate management in safe manner.</b>	OAC 3745-27-14
<b>Closures with Waste in Place (Capping)</b>	<b>Provides authority to prosecute for violations of any section of Chapter 3734.</b>	ORC 3734-10
	<b>Provides authority to investigate conditions at any site where the treatment, storage or disposal of hazardous waste may constitute a threat to public health or safety, or threaten contamination of the environment.</b>	ORC 3734-20 <sup>(a)</sup>
	<b>Noxious smells and obstruction/pollution of waterway prohibited.</b>	ORC 3767.13
	<b>Explosive gas monitoring plan and inspection requirement.</b>	ORC 3734-041
	<b>Conditions for disposal of acute hazardous waste listed in 40 C.F.R. 261.33 (c).</b>	ORC 3734-141 <sup>(a)</sup>
	<b>Air pollution nuisance prohibited.</b>	OAC 3745-15-07, A
	<b>Emission controls for fugitive dust.</b>	OAC 3745-17-08, A1, A2, B, D
	<b>Allowable methods of solid waste disposal.</b>	OAC 3745-27-05, A, B, C

TABLE 25 (continued)

Actions	Requirement	Citation
Closure with Waste In Place (Capping)	Technical information and sanitary landfill.	OAC 3745-27-06, B, C
	Construction specifications and sanitary landfill.	OAC 3745-27-08, C, D-H OAC 3745-27-11, A, B, G
	Sanitary landfill operational requirements.	OAC 3745-27-06, B, C OAC 3745-27-08, D-H OAC 3745-27-09, N, O OAC 3745-27-11, A, B, G, OAC 3745-27-14, A
	Sanitary landfill and ground water monitoring	OAC 3745-27-10, B, C, D
	Final closure and sanitary landfill.	OAC 3745-27-11, A, B, G
	Post-closure care, sanitary landfill.	OAC 3745-27-14, A
	Permit information and all hazardous waste facilities.	OAC 3745-50-44(a)
	Permit information for all hazardous land disposal facilities.	OAC 3745-50-44, A(a)
	Establish substantive requirements for hazardous waste treatment and disposal permits.	OAC 3745-50-44, B, C7(a)
	General analysis of hazardous waste.	OAC 3745-54-13, A(a)
	Inspection requirements for hazardous waste facilities.	OAC 3745-54-15, A - C(a)
	Location standards for hazardous waste TSD facilities.	OAC 3745-54-17, A - C(a)
	Design and operation of hazardous waste facilities.	OAC 3745-54-31(a)
	Emergency equipment, communication, alarm, local authority arrangements, contingency plan contents, emergency coordinator, emergency procedures, plan amendments.	OAC 3745-54-32, A, B, C, D OAC 3745-54-33 OAC 3745-54-34 OAC 3745-54-35 OAC 3745-54-37, A OAC 3745-54-52, A F OAC 3745-54-54, A OAC 3745-54-55 OAC 3745-54-56, A F(a)

TABLE 25 (continued)

Actions	Requirement	Citation
Closure with Waste In Place (Capping)	General closure performance standard and hazardous waste facility.	OAC 3745-55-11, A, B, C (a)
	Contents of closure plan and hazardous waste facility.	OAC 3745-55-12, B(a)
	Disposal/decontamination of equipment, structures and soils	OAC 3745-55-14(a)
	Submission of survey plan following closure including notation to restrict disturbance.	OAC 3745-55-16(a)
	Post-closure care and use of property.	OAC 3745-55-17, B(a)
	Post-closure plan information.	OAC 3745-55-18, B(a)
	Notice to Local Land Authority.	OAC 3745-55-19, B(a)
	Environmental performance standards, landfill design and operating requirements, monitoring and inspecting landfills, closure and post-closure care.	OAC 3745-57-01, A, D OAC 3745-57-03, A, I OAC 3745-57-05, A, B OAC 3745-57-10, A, B)(a)
	Landfill requirements for ignitable/reactive wastes.	OAC 3745-57-12, A, B(a)
	Landfill construction inspections.	OAC 3745-57-17, A(a)
Consolidation	Provides authority to prosecute for violations of any section of Chapter 3734.	ORC 3734.10
	Approval of plans for disposal of wastes.	ORC 6111.45 ORC 3734.02 OAC 3745-52-11 through OAC 3745-52-44 OAC 3745-59
	Air pollution nuisance prohibited.	OAC 3745-15-07, A
	Emission controls for fugitive dust.	OAC 3745-17-08, A1, A2, B, D
	Allowable methods of solid waste disposal.	OAC 3745-27-05, A, B, C

TABLE 25 (continued)

Actions	Requirement	Citation
Consolidation (Cont'd)	Sanitary landfill operational requirements.	OAC 3745-27-06, B, C OAC 3745-27-08, C, D - H OAC 3745-27-09, C, F, H, I, L, N, O OAC 3745-27-12, A, B, D, E, M, N
	Operating requirements and sanitary landfill.	OAC 3745-27-19, A-L, N-Q
Direct Discharge of Treatment System Effluent	Acts of water pollution prohibited.	ORC 6111.04
	Compliance with national effluent standards required.	ORC 6111.042
	Surface water analytical and collection procedures.	OAC 3745-1-03
	Surface waters shall meet "five" standards, anti-degradation policy, mining zones.	OAC 3745-01-04 OAC 3745-01-05 OAC 3745-01-06
	Water use designations, Great Miami River basin.	OAC 3745-01-21 OAC 3745-01-17
	Ohio NPDES permit requirements.	OAC 3745-33
	Discharge permit for POTW and pre-treatment rules.	OAC 3745-03-01 to 09
	Conservancy district rules and regulations pertaining to channels, ditches, pipes, sewers, etc.	ORC 6101.19
	Water Quality Criteria for decision by director.	OAC 3745-32-05
	Air and water permit criteria sufficient air quality standard and best available technology.	OAC 3745-31-05
	Maximum contaminant levels for inorganic chemicals.	OAC 3745-01-11, A, B
	Maximum contaminant levels for organic chemicals	OAC 3745-01-12, A - C
	Inorganic contaminant monitoring requirements.	OAC 3745-01-23, A
	Organic contaminant monitoring requirements.	OAC 3745-01-24, A - E



TABLE 25 (continued)

Actions	Requirement	Citation
Direct Discharge of Treatment System Effluent (Cont.)	Analytical techniques for MCLs.	OAC 3745-11-27, A - C
Excavation	Approval of digging where solid waste landfill was located.	ORC 3734-02 OAC 3745-27-13
	Provides authority to prosecute for violations of any section of Chapter 3734.	ORC 3734-10
	Air pollution nuisance prohibited	OAC 3745-15-07, A
	Emission controls for fugitive dust.	OAC 3745-17-08, A1, A2, B, D
	Sanitary landfill operational requirements.	OAC 3745-27-06, B, C OAC 3745-27-07, A, B, C, H OAC 3745-27-08, C, D - II OAC 3745-27-09, C, F, H, I, L, N, O OAC 3745-27-12, A, B, D, E, H, I, J, N
Gas Collection and Treatment	Provides authority to investigate conditions at any site where the treatment, storage or disposal of hazardous waste may constitute a threat to public health or safety, or threaten contamination of the environment.	ORC 3734-20(4)
	Malfunction and maintenance air pollution control equipment.	OAC 3745-15-06, A1, A2
	Good engineering stack height required.	OAC 3745-16-02, B, C
	Organic matter emission control from stationary sources (best available control technology).	OAC 3745-21-07, A, B, I
	Cannot degrade air quality where existing quality is equal to or greater than specified in OAC 3745-17-02.	OAC 3745-17-05
	Visible emissions and nuisance.	OAC 3745-17-07
	Restrictions on particulate emissions from fuel burning equipment.	OAC 3745-17-10
	Ambient air quality standards for particulates.	OAC 3745-17-02
	Ambient air quality standards for sulfur dioxide.	OAC 3745-18-02

**TABLE 25 (continued)**

Actions	Requirement	Citation
Gas Collection and Treatment (Cont.)	Methods for determining compliance with allowable sulfur dioxide emissions.	OAC 3745-18-04
	Sulfur dioxide ambient monitoring requirements.	OAC 3745-18-05, A
	Sulfur dioxide emission limit provisions.	OAC 3745-18-06, A - G
	Open burning standards in non-restricted areas.	OAC 3745-19-04, A - D
	Ambient air quality standards and guidelines for carbon monoxide, ozone, and non-methane hydrocarbons.	OAC 3745-21-02
	Cannot degrade air quality where existing quality is equal to or greater than specified in OAC 3745-21-02.	OAC 3745-21-05
	Control of emissions of carbon monoxide from stationary sources.	OAC 3745-21-08
	Ambient air quality standards for nitrogen dioxide.	OAC 3745-21-01
	Methods for measurements of nitrogen dioxide.	OAC 3745-23-02
	Cannot degrade air quality where existing quality is equal to or greater than specified in OAC 3745-23-01.	OAC 3745-23-04
	Nitrogen dioxide emission control: stationary sources.	OAC 3745-23-06
	Emission control program if emit 0.25 tons per day or more of air contaminants for which air quality standards had been adopted.	OAC 3745-25-03
	Operating requirements and sanitary landfill.	OAC 3745-27-08, C, D - H OAC 3745-27-19, A-L, N-Q OAC 3745-27-12, A, B, D, E, I, J, L, M, N
	Air and water permit criteria: ambient air quality standard and best available technology.	OAC 3745-31-05

TABLE 25 (continued)

Actions	Requirement	Citation
Gas Collection and Treatment (Cont.)	Establish substantive requirements for hazardous waste treatment and disposal permits.	OAC 3745-50-44, B, C <sup>(4)</sup>
	Identifies maximum time periods that a generator may accumulate hazardous waste without being considered an operator of a storage facility.	OAC 3745-52-34 <sup>(4)</sup>
	General analysis of hazardous waste.	OAC 3745-54-13, A <sup>(4)</sup>
	Inspection requirements for hazardous waste facilities.	OAC 3745-54-15, A - C <sup>(4)</sup>
	Location standards for hazardous waste TSD facilities.	OAC 3745-54-17, A - C <sup>(4)</sup>
	Design and operation of hazardous waste facilities.	OAC 3745-54-31 <sup>(4)</sup>
	Emergency equipment, communication, alarm, local authority arrangements, contingency plan contents, emergency coordinator, emergency procedures, plan amendments.	OAC 3745-54-32, A, B, C, D <sup>(4)</sup> OAC 3745-54-33 OAC 3745-54-34 OAC 3745-54-35 OAC 3745-54-37, A OAC 3745-54-52, A-F OAC 3745-54-54, A OAC 3745-54-55 OAC 3745-54-56, A-1
O&M	Disposal/decontamination of equipment, structures and soils.	OAC 3745-55-14 <sup>(4)</sup>
	Provides authority to prosecute for violations of any section of Chapter 3734.	ORC 3734.10
	Provides authority to investigate conditions at any site where the treatment, storage or disposal of hazardous waste may constitute a threat to public health or safety, or threaten contamination of the environment.	ORC 3734.20 <sup>(4)</sup>
	Allowable methods of solid waste disposal.	OAC 3745-27-05, A, B, C
	Establish substantive requirements for hazardous waste treatment and disposal permits.	OAC 3745-50-44, B, C <sup>(4)</sup>

TABLE 25 (continued)

Actions	Requirement	Citation
O&M (Cont'd)	Identifies maximum time periods that a generator may accumulate hazardous waste without being considered an operator of a storage facility.	OAC 3745-52-34(a)
	Hazardous waste facility permit conditions	OAC 3745-50-58(a)
	General analysis of hazardous waste.	OAC 3745-54-13, A(a)
	Security for hazardous waste facilities.	OAC 3745-54-14, A, B, C(a)
	Inspection requirements for hazardous waste facilities.	OAC 3754-15, A D(a)
	Design and operation of hazardous waste facilities.	OAC 3745-54-31(a)
	Disposal/decontamination of equipment, structures and soils.	OAC 3745-55-14(a)
	Abandonment of test holes and ground water wells.	OAC 3745-9-10, A C
Treatment	Provides authority to prosecute for violations of any section of Chapter 3734.	ORC 3734-10
	Provides authority to investigate conditions at any site where the treatment, storage or disposal of hazardous waste may constitute a threat to public health or safety, or threaten contamination of the environment.	ORC 3734-20(a)
	Approval of plans for disposal of wastes.	ORC 6111.45
	Air pollution nuisance prohibited.	OAC 3745-15-07, A
	Organic matter emission control from stationary sources (best available control technology).	OAC 3745-21-07, A, B, I
	Emission control program if emit 0.25 tons per day or more of air contaminants for which air quality standards had been adopted.	OAC 3745-25-03
	Air and water permit criteria-air pollutant air quality standard and best available technology.	OAC 3745-31-05

TABLE 25 (continued)

Actions	Requirement	Citation
Treatment (Cont.)	Establish substantive requirements for hazardous waste treatment and disposal permits.	OAC 3745-50-44 B, C <sup>(a)</sup>
	Additional permit information and hazardous waste storage in tanks.	OAC 3745-50-44, C <sup>(a)</sup>
	Identifies maximum time periods that a generator may accumulate hazardous waste without being considered an operator of a storage facility.	OAC 3745-52-34 <sup>(a)</sup>
	General analysis of hazardous waste.	OAC 3745-54-13 A <sup>(a)</sup>
	Hazardous waste facility permit conditions.	OAC 3745-50-58 <sup>(a)</sup>
	Inspection requirements for hazardous waste facilities.	OAC 3745-54-15, A - C <sup>(a)</sup>
	Design and operation of hazardous waste facilities.	OAC 3745-54-31 <sup>(a)</sup>
	Emergency equipment, communication, alarm, local authority arrangements, contingency plan contents, emergency coordinator, emergency procedures, plan amendments.	OAC 3745-54-32, A, B, C, D OAC 3745-54-33 OAC 3745-54-34 OAC 3745-54-35 OAC 3745-54-37, A OAC 3745-54-52, A-F OAC 3745-54-54, A OAC 3745-54-55 OAC 3745-54-56, A, B <sup>(a)</sup>
	Disposal/decontamination of equipment, structures and soils.	OAC 3745-55-14 <sup>(a)</sup>
	Design of tank systems, components, containment, leak detection, operating requirements, inspections, response to spills or leaks, closure and post-closure.	OAC 3745-55-92, A, B OAC 3745-55-93, A-B, I OAC 3745-55-94, A, B, C OAC 3745-55-95, A-D OAC 3745-55-96, A, B, C, E OAC 3745-55-97, A, B <sup>(a)</sup>
	Landfill requirements for ignitable/reactive wastes.	OAC 3745-57-12 A, B <sup>(a)</sup>
	Environmental performance standard, monitoring analyzing, inspections, and miscellaneous units.	OAC 3745-57-91, A, B, C OAC 3745-57-92 <sup>(a)</sup>

**TABLE 25 (continued)**

Actions	Requirement	Citation
Ground Water Monitoring	Provides authority to investigate conditions at any site where the treatment, storage or disposal of hazardous waste may constitute a threat to public health or safety, or threaten contamination of the environment.	OAC 3734-20(a)
	Ground water monitoring and hazardous waste facility.	OAC 3745-54-90 through 96 OAC 3745-54-97, A-H OAC 3745-54-98, A-I OAC 3745-54-99, A-J OAC 3745-55-11, A-C(a)
	Post-closure care and use of property.	OAC 3745-55-17, B(a)
	Construction design startup and operation, and ground water wells.	OAC 3745-9-05, A1, D-F, H OAC 3745-9-06, A, B, D, E OAC 3745-9-07, A-F OAC 3745-9-08, A-C OAC 3745-9-09, A-C, E-G
	Abandonment of test holes and ground water wells.	OAC 3745-9-10, A-C

**RESPONSIVENESS SUMMARY FOR  
POWELL ROAD LANDFILL  
MONTGOMERY COUNTY  
HUBER HEIGHTS, OHIO**

**PURPOSE**

The Responsiveness Summary serves two vital functions; 1) it provides the U.S. EPA and Ohio EPA with information about the views of the public, government agencies, and potentially responsible parties (PRPs) regarding the proposed remedial action and other alternatives; and 2) it documents how comments have been considered during the decision-making process and provides answers to all significant comments.

Comments received during the public comment period identified major issues and concerns of the public, including the local community living in the immediate vicinity of the Powell Road Landfill Superfund Site (PRL). Community comments comprise Section I below. Concerns of the Potentially Responsible Parties (PRPs) are identified in Section II below. All comments are grouped by topic, followed by general comments, if applicable.

**I. COMMUNITY CONCERNS**

**NEEDMORE ROAD PLUME**

**COMMENT:**

I understand this study did not prove a definite link between the Needmore Road plume and Powell Road Landfill (PRL). However, I would seek a commitment to continue to look (for the link). A specific addition should be made to the alternative to continue to search for linkages between Needmore Road plume and Powell Road Landfill contamination.

**COMMENT:**

We're concerned because even though you didn't find a link between the Needmore Road plume and the landfill, it does not mean that the link is not there. There's a small chance that it is. And you're taking a small chance with our future water supply. I don't think you're doing your job, because I think you better find out where those contaminants in the Needmore Road plume are coming from and not just say it could be anywhere, and we don't know, and move on.

**COMMENT:**

Does the clean-up remedy for Powell Road Landfill include the Needmore Plume? If not, will the clean-up remedy result in determining the origin of this plume?

**RESPONSE:**

The source of ground water contamination in the Needmore Road area has been investigated by the City of Dayton, Ohio EPA, and U.S. EPA. VOCs were identified in ground water 4,000 feet south of the landfill (Needmore Road area). The VOCs identified in the Needmore Road area consisted mainly of "ethene" VOCs. During the RI, a search was made to find the possible connection between PRL and ground water contamination in the Needmore Road area. New monitoring wells were installed in late 1990 and their locations were specifically planned to intercept any possible connection between PRL and the ground water contamination in the Needmore Road area. However, the sampling results of these wells did not reveal a connection. If PRL were the source of ground water contamination found in the Needmore Road area, ground water contaminants would have been found between PRL and the Needmore Road area. Additionally, dispersion of contaminants caused by migration from PRL to the Needmore Road area would occur, and downgradient contaminants in the Needmore Road area, would be equal-to, or more likely, less-than the ground water contamination found at PRL. However, ground water contamination was not found between the Needmore Road area and PRL, nor were the Needmore Road area ground water contamination levels equal-to or less-than contamination found at PRL. The "ethene" VOC contaminants found in the Needmore Road area were found at levels up to 4-times greater than "ethene" VOCs found in ground water adjacent to the landfill.

Should a connection ultimately be established between PRL and Needmore Road area, either a ROD amendment or Explanation of Significant Differences, as appropriate, will be prepared.

Based on the RI, we know where contamination related to PRL is located and it is important to remediate both existing contamination and the sources of that contamination to prevent further migration of contamination away from PRL.

**COMMENT:**

Based on the possibility that a mistake has been made and the Needmore Road plume is shown to be connected to Powell Road Landfill, wouldn't it be better to go with Alternative 7 now? In other words would Alternative 7 better address the Needmore Road plume than Alternative 5?

**RESPONSE:**

None of the alternatives presented in the Proposed Plan specifically address ground water contamination in the Needmore Road area. However, based on the limited information available to the Agencies regarding the ground water contamination in the Needmore Road area, the Agencies believe that Alternative 7 would not better address the ground water contamination in the Needmore Road area. Alternative 7 includes all the elements of Alternative 4, the selected remedial action, but Alternative 7



also includes extraction of ground water from the primary aquifer adjacent to the landfill and extraction of ground water from the primary aquifer south of the river, in the Eldorado Plat area. The ground water components in Alternative 7 actively remediates ground water contamination identified in the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area). None of these ground water elements, nor any element included in any of the seven alternatives, will address ground water contamination in the Needmore Road area.

COMMENT:

The combination of significant vertical flow potential below Powell Road Landfill and much higher levels of contamination at the bottom of the landfill, suggest that in the RI some possible connection between Powell Road Landfill and Needmore Road Plume, may have been missed, and that the landfill may be the source of Needmore Road Plume.

1) Data from the Remedial Investigation (RI) Report indirectly suggest that Powell Road Landfill is capable of generating a much larger contaminant plume than is suggested in the RI. Data from the RI Appendix show there is a stronger downward vertical flow gradient than horizontal flow gradient below the unconfined portions of the landfill. If Powell Road Landfill is capable of generating a larger contaminant plume than is suggested in the RI, and groundwater below the landfill is flowing downward at a very steep gradient, there may be a zone of contaminant transport between Needmore Road Plume and Powell Road Landfill that has not yet been detected.

2) The Remedial Investigation Report (RI) for Powell Road Landfill contains two highly questionable approaches to predicting the concentration of contaminants at the base of Powell Road Landfill: 1) averaging vent VOC levels from the landfill (7,050 ug/l) and, 2) using mass balance equations to back-calculate contaminant concentrations at the base of the landfill assuming that contaminant levels in MW04B represent the highest attainable levels of contaminants in the RI (p.5-12), (5,477 ug/l). Using these calculations the Remedial Investigation Report determines there is little serious health hazard from Powell Road Landfill except in the immediate vicinity of the landfill, by using the value of 5,477 ug/l for the probable VOC concentration at the base of the landfill. The RI calculates that leachate from Powell Road Landfill is diluted to an undetectable level by the time it reaches the Needmore Road Contaminant Plume. Using all of the same calculations from the RI, but substituting in a more environmentally realistic value for VOC levels at the base of Powell Road Landfill of 547,700 ug/l, it appears that contaminant levels downflow from the

landfill may present a significant health threat. By using this value for VOC levels at the base of the landfill, the concentration of 2992 ug/l, seems a more realistic value for VOC concentration that can be expected in the principal aquifer near Powell Road Landfill.

**RESPONSE:**

Although RI data suggests that PRL is capable of generating a much larger contaminant plume than was identified at the conclusion of the RI, the RI data identifies the extent and magnitude of ground water contamination that has been conclusively linked to PRL. The suggestions that a larger contaminant plume can be caused by the landfill associated with PRL and that a strong downward vertical flow gradient of ground water exists, do not alone support the theory that there is an actual zone of contaminant transport between PRL and the Needmore Road area. The RI investigated this potential zone of contaminant transport between PRL and the ground water contamination found in the Needmore Road area. However, the sampling results of the study did not confirm the existence of a zone of contaminant transport between PRL and the Needmore Road area.

The calculations used to predict the concentration of contaminants at the base of landfill associated with PRL were reviewed and approved by the Agencies in February, 1992. It is not true that these calculations determined that there is little serious health hazards from PRL. The risk calculations done in the RI used data collected from the ground water, air, soils, surface water and sediment, including leachate, and numerous risks to human health were identified. These risks are what drive the remedial action selected in the Record of Decision.

The RI calculations were conducted to identify if the levels of ground water contamination found in the Needmore Road area could be attributable to PRL. These calculations showed that the leachate from PRL is diluted to undetectable levels in the vicinity of Needmore Road. Additionally, the lack of ground water contamination between PRL and the Needmore Road area is an even stronger indication that the two areas are unrelated. Although the commenter suggests alternate ways of performing leachate calculations to support the theory of a connection between PRL and the Needmore Road area, the commenter does not provide any support for why the calculations are more scientifically defensible. Although the commenter does not feel the calculations were done appropriately, the Agencies realize that the leachate is one of the primary sources of contamination and risks in ground water, in addition to the landfill associated with PRL, and the selected remedy addresses both the landfill, by containment, and the leachate, by extracting and treating leachate. During the remedial action, the actual concentration of leachate in the landfill will be determined when leachate

extraction wells are installed in the landfill and leachate is pumped out.

The Agencies have included a provision in the Record of Decision that if the connection between PRL and the ground water contamination in the Needmore Road area is ever found, a ROD amendment or Explanation of Significant Differences will be prepared, as appropriate.

#### MIAMI NORTH WELL FIELD

##### COMMENT:

The proposed plan does not address the potential impact of the new Dayton well field located on Rip Rap Island, either on the effectiveness of the remedy, or migration of the contaminants from the landfill. Specifically, we'd like to see a mechanism to resolve responsibility for compensating for any impacts the Dayton well field may have on the remedy selected for the landfill.

##### COMMENT:

We are concerned about the proposed Dayton well field beside the landfill. The proposed well field is not specifically addressed in the remedy selection. This is a serious shortcoming. The remedy selection needs to be based on realistic future use scenarios.

##### COMMENT:

The proposed well field is mentioned only briefly in the report (Section 1.2.2 page 1-4) and was not considered in the risk assessment as a potential receptor of affected groundwater. The potential for contaminant migration into the planned well field area during long-term operation of the field should be considered in the risk assessment, and any implications to the seven remedial alternatives should be considered.

##### RESPONSE:

Ohio EPA's decision to approve installation of Phase I of the City of Dayton's new Miami North well field (located on Rip Rap Island) was based on numerous studies by the City from which a ground water model was developed. This model indicated that initial pumping rates of approximately 5 million gallons per day would not induce flow of contaminants from PRL. The City agreed to constrain pumping rates to these levels, until such time as remedial actions are underway at PRL. Further development of the well field will be considered for approval by Ohio EPA contingent upon an evaluation of on-going ground water monitoring conducted by the City of Dayton, production capability information, and contaminant movement information. Information generated by the selected remedial action is also expected to be reviewed. Also, Ohio Administrative Code 3745-9-04 restricts location of a well

where contaminants may be conducted into the well. The Record of Decision provides that a ground water monitoring system that will be established on PRL (around the landfill and south of the river (Eldorado Plat area)) to closely observe conditions between PRL and this area. One of the purposes of the ground water monitoring system is to monitor for changes in ground water flow and potential migration of contaminated ground water from PRL to the Miami North well field.

Mechanisms for resolving responsibility for any impacts the Miami North well field may have on the selected remedial action rest solely with the person or persons performing the remedial action and the City of Dayton. It is the Agencies' responsibility to ensure that the remedial action (RA) remains protective of human health and the environment over the duration of the RA. If at any time it is determined that the ROD is not protective of human health and the environment, a ROD amendment or Explanation of Significant Differences will be prepared, as appropriate.

The potential for contaminant migration into the planned well field area during its long-term operation was not incorporated into the risk assessment because the risk assessment for PRL was completed as part of the Remedial Investigation report and deemed final in March, 1992. At the time the risk assessment was performed, the Miami North well field was only a proposal. As is usual for Superfund sites, U.S. EPA's Risk Assessment Guidance For Superfund (RAGS) was used to evaluate a number of scenarios. The scenarios were based on the remedial investigation data which indicates ground water flow is generally from north to the south in the vicinity of PRL. Remedial investigations, by their very nature, are designed to be finite -- a snap shot of the conditions at a site over a certain period of time. As stated above, at the time the risk assessment was performed, the Miami North well field was a proposal. As stated above, Ohio EPA approved the Miami North well field based, in part, on the City of Dayton's modelling data that demonstrated that the well field would have no effect on contaminant migration at planned pumping rates. Information regarding any actual contaminant migration will be developed during and after the remedial action. This information will be considered before any further development of the well field will be approved. Conditions at any site will always be changing and there comes a time when the parties involved must decide that sufficient information has been gathered to select a remedy for a site. The Agencies feel it is essential to proceed with the selected remedial action at PRL based on the information gathered to date, which includes awareness of the potential effects of the Miami North well field on the scope and performance of the remedial action.

COMMENT:

The groundwater modeling frequently cited to indicate that the groundwater will not flow from the landfill toward the Dayton well field, Rip Rap Island, Miami north well field is a Geotrans model that was completed in the mid-'80s. And Geotrans didn't have the kind of data that we now have about the conditions on Rip Rap Island; therefore, their model assumed recharge that we now know won't occur, because there's a till layer there extensively covering that area, and they also assumed there would be recharge from the west. We now know that there's a bedrock high on the east and extensive till on the west; therefore, most of the recharge will occur from the east, which is the area of the Powell Road Landfill. It doesn't seem logical to decide on the Geotrans model and presuming that the Geotrans model accurately describes the current conditions.

More recently CH2M Hill has modeled the effect of one well on the northwest side of Rip Rap Island, which is the first well they proposed to be put in. Their model suggested that there only be a one-foot high groundwater divide between Powell Road Landfill and that one well, when that one well is operated. We have to presume that if there are any more wells operating it will draw water in from the area of Powell Road Landfill; therefore, we think it's extremely important that the Powell Road Landfill remedial design incorporate the probability that groundwater will be begin to flow toward the City of Dayton's well field.

RESPONSE:

A number of precautions are in place to ensure that even if ground water begins to flow from PRL toward the Miami North well field, the selected remedial action for PRL will not be compromised and contaminants from PRL will not migrate into the well field. As noted above, in addition to the modelling done for the RI, the City of Dayton also did extensive modeling and determined that the initial phase of development at the Miami North Well Field would not impact PRL. Further development will be delayed until the remedy is in place at PRL (i.e., contaminants are being captured). Ohio EPA stated in their approval letter for Phase I development that approval for further development of the well field would be based on a review of ongoing monitoring results, production capability information, and contaminant movement information. Also, Ohio Administrative Code 3745-9-04 restricts location of a well where contaminants may be conducted into the well. The details of the City of Dayton's well field proposal and the Ohio EPA approval letter are available for review in the Administrative Record for PRL.

COMMENT:

Dayton is installing a new well field, projected to produce 20+ million gallons per day, due west of Powell Road Landfill, on Rip Rap Island. Most of the well field is located in a zone that appears to contain a continuous till aquitard. If the till zone

west of Powell Road Landfill is as continuous as the till to the south of Powell Road Landfill, then the well field is being located in a zone of confined aquifer, and the cone of influence from Powell Road Landfill will likely extend to below Powell Road Landfill, especially to the south of Powell Road Landfill, where the till is continuous. This is the zone in the deep aquifer that is projected in the Feasibility Study, to be pumped for decontamination. Given the steep downward gradient, the presence of a confining till layer, and the presence of a large well field just west of the landfill, an alternative groundwater collection design might be considered for the landfill. Collection of contaminated groundwater from directly below the landfill seems a better way to design the system, since changes in regional groundwater flow would not affect the system very much. Costs to install a horizontal drain system would be comparable to costs to install the deep well collection system being proposed. However, pumping rates for a series of vertical wells located south of the landfill would have to be very high to keep the Dayton North Well Field from changing the regional flow system. It seems that pumping rates for a horizontal collection system installed below the landfill would be much lower.

COMMENT:

In your alternatives, you didn't consider directionally drilling wells below the landfill, instead of having a line of wells south of the landfill. If you had directionally drilled wells placed under the landfill you could more easily create a cone of depression that would reach across the entire landfill. There are companies that specialize in the installation of those now. And if you're aren't going to use directionally drilled wells, it seems logical that you would have leachate collection wells on the west side of the landfill for the eventual time when the new Dayton north well field begins to change the direction flow and begins to move contaminants to the west.

RESPONSE:

We appreciate your input on this issue. Horizontal collection systems, which consist of horizontal or directionally-drilled wells, are the "wave of the future" for ground water extraction. Currently, the costs of horizontal ground water extraction wells are high; however, they are being utilized more and more extensively at hazardous waste sites, and the costs appear to be decreasing. When the technologies available for remediation of PRL were first being developed in 1990-1991, this horizontal collection system technology was not included because it was not a proven technology as are the traditional vertical extraction well systems. Additionally, the ground water flow information for PRL showed that ground water flowed north to south.

However, despite the changes in technologies and the location of the new well field, the Agencies are confident that the precautions to monitor ground water during the selected remedial

action will address the potential for migration away from the PRL. As identified above, the remedial action will closely monitor ground water flow and potential ground water contaminant migration towards the new well field. Additionally, Ohio EPA has approved installation of Phase I of the new Miami North well field, based on ground water modelling developed by the City of Dayton. Further development of the well field will be considered for approval by Ohio EPA contingent on an evaluation of ongoing ground water monitoring results, production capability information, and contaminant movement.

Therefore, the Agencies are confident that extraction of ground water using vertical extraction wells during the remedial action will extract contaminated ground water at a sufficient level and will not be compromised by the new well field. It is the Agencies' responsibility to ensure that the remedial action (RA) remains protective of human health and the environment over the duration of the RA. If at any time it is determined that the ROD is not protective of human health and the environment, a ROD amendment or Explanation of Significant Differences will be prepared, as appropriate.

#### LOCAL WELL FIELDS

##### COMMENT:

Have there ever been, today or at any period of time in the last 20 years, any contaminants in the City of Huber Height's water system (Ohio Suburban Water Company) that are directly attributable to the Powell Road Landfill? If so what would be the health risk?

##### COMMENT:

What will be the impact of the new City of Dayton Miami North Well Field and the new Ohio Suburban (Huber Heights) well field on the effectiveness of the remedy at Powell Road Landfill? Will it change the direction of ground water flow?

##### COMMENT:

Ohio Suburban Water Company owns and operates 2 well fields; Needmore well field and Rip Rap Road well field. Each well field is currently producing approximately 2 million gallons per day on an average annual basis. The Needmore Road well field has been pumped at a rate of 6.5 million gallons per day during peak drought conditions. Special air stripping equipment was installed and rated at this capacity. The Rip Rap Road water treatment plant currently has a rated capacity of 2.0 million gallons per day. Future planned expansions at Rip Rap Road require a capacity of 6 to 8 million gallons per day.

Consequently, we feel these capacities are necessary to serve the future growth of their customers. Any reduction of this capacity

could result in the company having to seek other sources of water at a significant cost to our customers.

In preparing the final design for the remediation of Powell Road landfill contamination, special consideration should be given to any affects it might have on current and future pumpage from Ohio Suburban's Needmore Road and Rip Rap Road well fields.

**COMMENT:**

Significant use of water resources near the landfill could influence groundwater flow direction and the distribution of contaminants.

**RESPONSE:**

Contaminants were found in Ohio Suburban Water Company's (OSWC) Needmore Road production wells in 1984. These contaminants are believed to be from the ground water contamination in the Needmore Road area. Air strippers were installed at the well field to remove these contaminants from the ground water. As stated above, no connection has been found between PRL and the ground water contamination in the Needmore Road area.

The OSWC conducted a study for their new Rip Rap Road well field. This study indicates that the capture zone of the new well field does not reach the PRL Site and will not change the direction of ground water flow at PRL. This document is available for review in the Administrative Record.

**MONITORING**

**COMMENT:**

The feasibility study and the proposed plan did not address long-term monitoring after the cleanup objectives have been met and the groundwater and leachate extraction systems are shutdown. What is to prevent additional leachate from being generated by the infiltration of the surface water or ground water and what monitoring will be done to detect such future releases? The proposed plan (remedial action) should address the long-term monitoring that will be implemented to ensure that any future release which may occur following system shut-down are promptly detected. The plan should also contain provisions to reactivate the systems should a future release threaten human health or the environment.

**RESPONSE:**

You are correct; the FS does not address directly address long-term monitoring. The purpose of the FS is to develop alternatives which will address contamination and reduce risks posed by PRL. The Proposed Plan identified the Agencies' proposed remedial action to address contamination and reduce risks posed by PRL. Alternatives 3 through 7 of the Proposed



Plan contained the common component of ground water monitoring. The Record of Decision identifies the Agencies' selected remedial action to address contamination and reduce risks posed by PRL. The selected remedial action identified and detailed in the Record of Decision, contains one component, common to Alternatives 3 through 7, identified as ground water monitoring. The purpose of this component, ground water monitoring, is to 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water; and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from PRL. This component generally addresses ground water monitoring which will occur during the remedial action, during active ground water and leachate extraction and treatment. Details of the ground water monitoring component, including long-term ground water monitoring, will be developed during the remedial design of the selected remedy, and will include a plan which identifies the conditions under which ground water/leachate extraction and treatment systems will be reactivated. Additionally, the National Contingency Plan (NCP) addresses long-term monitoring. The NCP 40 CFR Part 300 Subpart E §300.430 (f)(4)(ii), states: "If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action." Therefore, since the selected remedial action at PRL will not directly address the landfill associated with PRL, but will contain the landfill with the landfill cap, the NCP requires the U.S. EPA to evaluate the conditions at PRL every five years, at a minimum, to determine that the remedial action is protective of human health and the environment.

COMMENT:

There's no discussion in the Feasibility Study of additional monitoring wells that will be put around the landfill. And when questions were asked about that, there was a discussion that suggested that EPA thinks that the current monitoring well network may be adequate. In fact, you'd need to establish a number of wells in lines radiating out from the landfill to have an early warning system, to know if the groundwater slope changes.

In the feasibility study, you've presumed that 17 leachate wells put into the landfill will adequately de-water the landfill. The monitoring well configuration doesn't include any sort of monitoring well system to assure us that this leachate collection design system or leachate collection system will work as designed. So we hope that you do incorporate additional monitoring wells, many additional monitoring wells to establish that your leachate removal system is functioning as designed.

COMMENT:

Monitoring wells should be north of the landfill in case ground water flow direction changes as a result of the new well fields' pumping.

COMMENT:

Why is this proposed plan so general? Where are the specifics?

RESPONSE:

You are correct; there is no discussion in the FS regarding the specific details of the ground water monitoring system around PRL. The purpose of the FS was to identify and screen technologies to address contaminated media and develop alternatives to address PRL as a whole. Specifics about ground water monitoring to be utilized during the remedial action will be detailed in the remedial design (design phase).

The exact number of wells needed to adequately monitor ground water fluctuations at PRL will be determined in the design phase. Some of the current monitoring wells may need to be relocated based on improvements made to the cap. In other areas, it may be determined that new monitoring wells, in addition to the current system, are needed for adequate monitoring. It is also important to note that the City of Dayton has a large number of monitoring wells located in the area of PRL and the Miami North well field. Both the City and the Agencies have exchanged data gathered from the area of PRL and will continue to do so. The Agencies believe that information from both the early warning system at the Miami North well field and the ground water monitoring system around PRL will provide sufficient information to determine any gradient fluctuations as well as any contaminant migration that may occur.

The feasibility study does not presume, but estimates that 17 leachate extraction wells will be utilized to extract leachate from the landfill. As stated previously, the Proposed Plan is meant to be a general plan for the remediation of PRL. Exact details, such as the exact number of leachate extraction wells, their placement, and their installation depth will be determined during the remedial design phase. The final number of wells to be installed will ensure that a slight flow of ground water into the landfill exists. As identified above, the monitoring system will be designed to evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water, and to monitor for changes in ground water flow and potential migration of contaminated ground water from PRL.

HYDRAULIC BARRIERS

COMMENT:

Containment of leachate below the landfill or prevention of infiltrating groundwater using a passive, low permeability barrier was not presented as a feasible remedial option in any of

the seven alternatives. This was reportedly due to the impractical depth to low-permeability materials below much of the landfill area. Vertical barriers are typically keyed into low-permeability materials to complete the containment.

However, the Hydrogeology section of the report documents that the low-permeability till underlies about 25 percent of the landfill, generally beneath most of the southern area. This area is located hydraulically downgradient of the landfill, the direction of shallow groundwater movement. The till is located at depths of about 25 to 40 feet beneath this area, which are feasible depths for constructing a vertical barrier.

The efficiency and cost/benefit of constructing a passive, low permeability barrier along portions of the landfill should be evaluated. Consideration should focus on the southern, downgradient portion of the landfill to restrict off-site leachate migration, and along the upgradient side to divert ground water flow around the landfill area. The placement of a barrier upgradient may be effective at reducing the flow of ground water beneath the site, and thus the volume of ground water to pump and treat, even though there is no till layer to key into. Innovative technologies for in-situ solidification of waste at the landfill base (horizontal barrier) should also be considered. If effective, these barriers could significantly reduce the long term risk of leachate migration, especially in the absence of indefinite maintenance of the leachate extraction and treatment systems.

COMMENT:

The feasibility study does not seriously evaluate the use of hydraulic barriers to control the flow of groundwater and leachate from the site. Such barriers may reduce the flow of groundwater beneath the site, thus reduce the quantity of groundwater to pump and treat, decrease the amount of leachate that may be generated from the landfill, and also reduce the impact of the new Dayton well field on the proposed remedy.

COMMENT:

The Feasibility Study documents a shallow unconfined aquifer directly underlying the landfill, and groundwater may rise into the landfill during periods of seasonal high water levels. This hydrologic scenario suggests that generation and migration of leachate, potentially containing hazardous constituents, could continue for an indefinite period. Consequently, long term protection of groundwater quality relies on indefinite monitoring and maintenance of the leachate extraction and treatment systems. The feasibility study should consider construction of a passive (no-maintenance) barrier (horizontal or vertical) to reduce the risk of leachate migration.

**RESPONSE:**

Both vertical and horizontal barriers, and hydraulic controls were identified as containment remedial technologies for the ground water/landfill leachate media in the Identification and Screening of Technologies section of the FS. During this screening, technologies were evaluated on the basis of technical effectiveness and implementability. Table 2.12 of the FS presents the results of the screening of these technologies. Vertical and horizontal barriers were screened out during this evaluation due to implementability issues which are related to the geology of the area.

There are many types of vertical barriers which may be viable at landfill sites, including upgradient barriers, downgradient barriers and barriers which completely encircle the landfill. Vertical barriers are generally set into a shallow confining layer.

An upgradient barrier is not implementable at PRL because a confining layer is not present on the upgradient, or north, side of the landfill.

A downgradient barrier, which may restrict the migration of contaminated ground water away from the landfill, is implementable but the technical effectiveness is limited. In the area of PRL, the shallow aquifer is separated from the primary aquifer only under approximately 25% of the landfill. If a vertical barrier is constructed in the shallow aquifer, on the south side of the landfill, and set into the confining layer, ground water contamination may flow around the barrier or ground water contamination may simply move downward, into the primary aquifer. Since there is very little contamination in the primary aquifer now, and the extent of ground water contamination in the shallow aquifer is limited, the Agencies do not want to create a bigger problem than already exists. Ground water extraction wells are often used with vertical barriers to create an inward ground water gradient, however, due to the prolific nature of the Great Miami River buried valley aquifer (GMR BVA) under PRL, an inward ground water gradient would be difficult, if not impossible, to achieve and control. Such a system may also compromise the leachate extraction system by drawing leachate away from the landfill and possibly creating a bigger problem than currently exists.

A vertical barrier which encircles a landfill requires the presence of a shallow, horizontal confining layer, into which the vertical barrier is set, to prevent downward migration of contamination. The combination of the vertical barrier encircling a landfill and a horizontal barrier creates a "bath-tub" effect to contain contaminants. At PRL, a continuous confining layer is not present under the entire landfill and therefore a vertical barrier is not implementable.

## POWELL ROAD LANDFILL PROPERTY

### COMMENT:

Will Powell Road Landfill property ever be used for other purposes? Are we writing off this piece of real estate for future generations?

### COMMENT:

How long will it be, after the cleanup, before the land can be developed?

### COMMENT:

Will the land be sold at public auction?

### RESPONSE:

The decision regarding sale of the property after the site is cleaned-up will be made by the property owners. Decisions regarding development of the property will be made by the owner (or future owner(s)) of the property. The institutional controls component of the selected remedial action may restrict certain development of the property.

Because the selected remedial action will leave the landfilled wastes in place, the National Contingency Plan (NCP) requires the U.S. EPA to evaluate the conditions of PRL every five years, at a minimum, to determine that the remedial action is protective of human health and the environment.

## GENERAL COMMENTS

### COMMENT:

There is a significant inconsistency between the Feasibility Study and the Proposed Plan regarding the quantity of leachate that will be recovered by the leachate extraction system (2,200 gallons per day versus 50,000 gallons per day). How will this discrepancy be resolved to ensure that the leachate extraction system is designed to capture all of the leachate?

### RESPONSE:

The Agencies disagree that there is a discrepancy between the FS and the Proposed Plan regarding the quantity of leachate that will be extracted from the landfill. The Proposed Plan does not identify an amount of leachate that will be extracted from the landfill and treated. The Proposed Plan does state on page 8 of the Proposed Plan that "Leachate will be extracted from the landfill at a rate sufficient to create a slight influx of ground water into the landfill to prevent migration of leachate out of the landfill". The quantity of leachate to be extracted from the landfill will be determined during the remedial design and remedial action.

The Agencies did identify that estimated amounts of leachate to be extracted from the landfill were different in the two draft Feasibility Study reports submitted to the Agencies in August, 1992 and December, 1992. Rather than delaying the finalization of the December, 1992 FS, the Agencies decided to finalize the FS with a comment letter, dated March 2, 1993, which became an insert to December 1992 FS report. In this comment letter, the Agencies identified the inconsistencies in the quantities of leachate and stated that, whatever the amounts are finally determined to be, "... the burden of designing a system capable of handling the amounts calculated rests with the [person or persons performing the RD/RA]."

COMMENT:

I am concerned with the Proposed Plan and the study that happened. Even though it was done under the care and supervision of EPA, Waste Management hired or subcontracted the work that was done for the study, and when I see that the EPA trusts Waste Management, I cannot trust the EPA.

RESPONSE:

Initially the Powell Road Landfill Superfund Site was a "Superfund-lead" site meaning that U.S. EPA and Ohio EPA (the Agencies) were performing the work at the site using money from the Superfund. The Agencies developed a statement of work and had begun to develop the work plan when SCA Services of Ohio, (SCA) a subsidiary of Waste Management of North America, Inc., indicated that they were willing to undertake the study, which turned PRL into a "PRP-lead" site. This means the PRP pays for and performs the investigation. SCA proceeded with the study based on the Statement of Work developed by the Agencies. Therefore, the Agencies had a large amount of input into the initial design of the study. Also, at the time that SCA took over the project, the company entered into a Consent Order with the Agencies. A Consent Order is a legally binding document identifying what work is to be done, how it is to be done, and what penalties shall be incurred if the conditions of the Consent Order are not met. Throughout the RI and FS process, representatives of both Agencies provided oversight, including reviewing and commenting on documents and splitting environmental samples to verify the PRP's sampling results. Also, the Miami Valley Landfill Coalition (MVLCC), a local citizen's group who obtained a Technical Assistance Grant (TAG) from U.S. EPA, provided input to the Agencies by reviewing numerous documents. All of this oversight, review of and comment on documents, and review of and comment on data prepared by PRPs, is to ensure that the work is performed properly, regardless of who is doing it.

COMMENT:

I know you've studied it (PRL) to death, but are you really going to clean it up? I think you're going to cap it off, take water (monitor) every once in a while and try to contain it.

RESPONSE:

The selected remedial action for PRL includes much more than capping and monitoring. The landfilled wastes will remain in place, and a landfill cap with a liner will be constructed on the landfill. The cap will do much more than simply cover the landfill. The cap will also prevent rainfall from filtering through the landfill and carrying contaminants into the ground water. In addition to an improved landfill cap with liner and a ground water monitoring system, the remedial action includes removing and treating gas from the landfill, landfill liquids (leachate), and ground water. Some of the components of the selected remedy will contain contaminants at PRL, and will reduce the mobility of contaminants. All components of the selected remedy, including treatment of ground water, leachate, and landfill gases, will reduce risks posed to the public and be protective of the environment.

COMMENT:

My mother (who lives near the landfill) says there are contaminants in her well right now. There's bacteria that has been continually coming into the wells, the new well that she had to pay to drill, and she doesn't know where it's coming from. They can't find out where it's coming from. The neighbor has the same problem. And she lives right next to the landfill.

RESPONSE:

The Agencies investigation of this issue determined that this particular residential well is located to the east of PRL. Based on results from several sampling events (which include water level measurements to determine the flow direction of ground water), there has been no indication that contaminants from PRL are migrating to the east. Also, there has been no indication that bacterial contamination in wells has been linked to PRL. The presence of bacteria in wells can be attributed to a number of things such as well construction defects, condition of the well based upon age, the well location (for example, near the leach field for a septic system, or in limestone rock), etc. Anyone having a problem with excessive bacteria in their private well should contact their county health department (in this case Montgomery County Health Department at 513-225-4395) for ways to treat this problem.

COMMENT:

The feasibility study addresses only leachate generated by the infiltration of surface water or appears to address only that. What about the leachate generated by the contact of the landfill waste or the landfill material with rising groundwater levels?

RESPONSE:

The leachate extraction system will address all liquids in the landfill, whether the liquid is generated by infiltrating surface water or by contact with ground water.

COMMENT:

Does the clean-up remedy include the near-by river?

RESPONSE:

No, the clean-up remedy does not include the Great Miami River. The Remedial Investigation (RI) sampling of surface water and sediment of the Great Miami River (GMR) and adjacent intermittent streams did not identify any impact from PRL in the form of VOC, semivolatile or inorganic contamination which are the types of contaminants associated with PRL.

Under current use conditions, carcinogenic and non-carcinogenic risks were identified during the Risk Assessment for ingestion of fish caught from the backwater area of the Great Miami River. These risks were based on data from contaminated soils found around the landfill, and assumed that the contaminated soils could migrate into the surface water. The selected remedy will reduce this risk by excavating and consolidating contaminated soils on top of the landfill and construction of the landfill cap with liner on the landfill.

COMMENT:

Did ATSDR and the Ohio Department of Health respond to the comments on their draft health assessment document for Powell Road Landfill?

RESPONSE:

Yes. Review of the final health assessment indicates that comments submitted on the draft health assessment are incorporated into the final document dated April 22, 1993.

COMMENT:

How are you incorporating the Ohio Department of Health's Health Assessment, into your remedy selection?

RESPONSE:

The U.S. EPA and Ohio EPA have reviewed the Health Assessment which presents seven recommendations. The first two recommendations, "Adequate personal protective equipment should be worn during site remediation to limit exposure to VOCs in on-site air.", and "Monitoring on-site ambient air during remediation to insure the safety of on-site workers and nearby residents ...", will be included in the Health and Safety Plan to be prepared in the remedial design, and implemented during the remedial action. The third recommendation, "Expand the soil gas survey to determine the extent of soil gas contamination.", is not included in the selected remedial action. The selected remedial action will address soil/landfill gases by reducing landfill gas migration by extracting gases from the landfill and treating the gases with a flare assembly. The fourth recommendation is "Ground water monitoring should be done at area water supplies (public and private) ...". Private well sampling



of select residential wells will be conducted as part of the ground water monitoring component of the selected remedial action. Public area water supply wells are not affected by PRL and will not be addressed in the remedial action. The fifth recommendation, "Implement flood control methods to reduce the impact of flooding of the Great Miami River on the base of the landfill.", is incorporated into the selected remedial action. The sixth recommendation, "Regularly inspect the methane alarms in the two homes north of the site.", is not incorporated into the remedial action. The monitors present in these homes were not installed by either U.S. EPA or Ohio EPA, and the ROD will not address these monitors. The seventh recommendation, "When indicated by public health needs, and as resources permit, the evaluation of additional relevant health outcome data and community health concerns, if available, is recommended.", is not a recommendation which can be incorporated into the selected remedial action. However, these issues will be addressed if necessary during the remedial design/remedial action.

COMMENT:

Is there a formal partnership between Ohio Suburban, Dayton Water Department, OEPA, and the USEPA to promote communication with the potential PRP'S?

RESPONSE:

There is not a formal partnership or agreement, such as a Consent Order, between the above parties.

The U.S. EPA is promoting communication with the PRPs identified for Powell Road Landfill Superfund Site. On May 21, 1993, U.S. EPA issued a General Notice Letter to approximately 40 potentially responsible parties (PRPs). One purpose of the General Notice Letter was to encourage all PRPs to meet and establish a steering committee responsible for representing the group's interests. The first meeting of PRPs was held on Wednesday, June 9, 1993 in Dayton, Ohio. The U.S. EPA and Ohio EPA were present at this meeting.

COMMENT:

Has Waste Management agreed to clean up the landfill? If not, what will happen to the clean-up process (i.e., will it be delayed for a long time)?

RESPONSE:

No, Waste Management has not agreed to clean-up PRL. In November, 1987, SCA Services of Ohio (SCA), a subsidiary of Waste Management of North America, Inc., entered into a Consent Order with the U.S. EPA and Ohio EPA to conduct the Remedial Investigation and Feasibility Study of PRL.

Now that the technical terms of the RI/FS Consent Order are complete, U.S. EPA has initiated communication with SCA and other

PRPs to begin discussing the remedial design and remedial action (RD/RA) work to be done next at PRL. The U.S. EPA expects to actively pursue RD/RA discussions with PRPs once the ROD is final.

Typically at Superfund Sites, U.S. EPA sends out special notice letters to PRPs which initiates the 60 day moratorium on remedial activities at the Site, allowing time for PRPs to settle with the U.S. EPA. If at the end of 60 days, the PRPs do not settle with U.S. EPA, but present a good faith offer, the moratorium will typically be extended another 60 days. If the moratorium ends without a settlement being reached, the U.S. EPA has several options including; issue a Unilateral Administrative Order to PRPs instructing them to conduct the remedial design/remedial action, or use the funding available under the "Superfund" to begin the RD/RA process. Therefore, the Agencies will actively pursue RD/RA negotiations and yet will not delay the cleanup process of the PRL, if those negotiations fail.

COMMENT:

Will individuals, who have lived in fear for several years near Powell Road Landfill be compensated?

RESPONSE:

Any form of compensation to individuals affected by PRL will not be addressed by the selected remedial action or the remedial design/remedial action process. Any persons seeking compensation for harm related to PRL should seek the advice of a private attorney.

COMMENT:

The groundwater is designated as a federal sole-source aquifer and is protected by the City of Dayton's Well Field Protection program. Is the remedy selection adequate to protect this resource for future generations?

RESPONSE:

Yes, the selected remedy will protect the ground water of the Great Miami River buried valley aquifer (sole-source aquifer). Protection of the sole-source aquifer has been a major consideration behind the extensive investigation in the area of PRL and the Agencies efforts to get the most protective remedy possible under the law.

The selected remedy includes a landfill cap with liner, excavation and consolidation of contaminated soils under the landfill cap, ground water monitoring, landfill gas collection and treatment, leachate extraction and treatment, extraction of ground water from the shallow aquifer and treatment, discharge of treated ground water and leachate. The landfill cap will address ground water contamination by reducing infiltration of precipitation into the landfill thereby reducing generation of

leachate and also reducing the percolation of leachate from the landfill and ground water. Leachate and shallow ground water extraction and treatment will address the remaining sources of contamination in the primary aquifer adjacent to the landfill and south of the river in the Eldorado Plat area. Once the landfill cap is constructed, the leachate and ground water extraction and treatment systems are operational, ground water contamination in the primary aquifer, both adjacent to the landfill and south of the river (Eldorado Plat area), is expected to decrease and cleanup levels (identified in the ROD) will be achieved in an estimated 6 years. Because this remedial action will result in hazardous substances remaining on-site, a review will be conducted within five years after commencement of the remedial action to insure that the remedial action continues to provide adequate protection of human health and the environment.

COMMENT:

The Feasibility Study for Powell Road Landfill presumes a very small vertical gradient below Powell Road Landfill. Given the magnitude of the vertical gradient in the vicinity of the landfill, and the proximity to the Dayton North Well Field being developed on Rip Rap Island, the assumption used in the RI that groundwater flows predominantly horizontally, and will continue to flow from north to south in the vicinity of the landfill, needs careful scrutiny.

RESPONSE:

The Agencies are aware that the proximity of the local well fields to PRL could possibly affect the ground water flow in the area. The selected remedial action includes a ground water monitoring component to address this issue. The purpose of the ground water monitoring component is twofold: 1) to evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water; and, 2) to monitor for changes in ground water flow and potential migration of contaminated ground water from PRL.

COMMENT:

I live 800 feet north-northeast of Powell Road Landfill, and I am concerned about methane gas odors which are especially evident during the hot humid summer months of June, July, and August. There are many new homes being built in this area where young children may be exposed to this methane gas. I think the methane gas problem needs to be addressed first.

**RESPONSE:**

The selected remedy will address methane gases in the landfill through the design and construction of a landfill gas extraction and treatment system. The gas extraction wells installed in the landfill will extract gases from the landfill. The landfill gases will be collected and treated on-site using a flare assembly. The schedule for the remedial activities will be decided during the remedial design.

**COMMENT:**

Will a transcript of the June 2, 1983 meeting be available?

**RESPONSE:**

Yes, the transcript of the June 2, 1993 meeting is available for review at the Administrative Record locations at the Dayton-Montgomery County Public Library and U.S. EPA offices in Chicago, Illinois.

**COMMENT:**

Will the roads around the landfill support the heavy equipment needed for the land and water cleanup?

**RESPONSE:**

During the design of the remedy, the condition and stability of any roads needed for access by heavy equipment to the site will be evaluated. If necessary, the roads will be improved to handle usage by heavy equipment.

**COMMENT:**

Will there be more meetings in Huber Heights to explain the process?

**RESPONSE:**

No additional public meetings are scheduled at this time. The U.S. EPA will issue a press release and publish an advertisement in the local newspapers when the Record of Decision, which documents the Agencies' selected remedy, is final. The Agencies are planning to hold an Availability Session in the Huber Heights area in October, 1993 to discuss ground water issues related to residential wells.

**COMMENT:**

I do not understand why you do not have people/groups of the community enter into the agreement (Consent Order).

**RESPONSE:**

The Consent Order is an agreement between PRPs and government Agencies. People/citizens of a community are represented by Ohio EPA and U.S. EPA. The community is also part of the RI/FS process through public meetings and the public comment period.

At the Powell Road Landfill Superfund Site, the Miami Valley Landfill Coalition (MVLIC), a local citizen's group, obtained a Technical Assistance Grant from U.S. EPA, and has been directly involved with the work done at PRL since 1989. MVLIC has provided input to the Agencies by reviewing and commenting on numerous documents during the RI and FS.

COMMENT:

I am concerned that when the VOCs are stripped from the water [at the OSWC Needmore Road well field] they are simply put into the air. Which is worse, breathing them or drinking them?

RESPONSE:

Volatile organic compounds are stripped from the ground water and emissions are released to the air. Air stripper emissions are released in a controlled and carefully monitored manner and are subject to regulations as are all the treatment systems to be utilized in the selected remedial action.

COMMENT:

When were the ground water sampling events and do they all support each other? Does the 1993 data indicate that contamination has moved considerably from the site since 1991? What is your percentage of error on that?

RESPONSE:

Ground water sampling events during the RI occurred in December, 1988, April, 1989 and February 1991. In March, 1993, the Agencies requested that the PRP sample select monitoring and residential wells. Data from the 1993 sampling event indicates that ground water contamination levels remained at similar levels which were detected in 1988, 1989 and 1991, and contaminant distribution has not changed since 1991.

COMMENT:

How many Eldorado Plat residential wells have been tested and how often?

RESPONSE:

Residential wells were sampled in August, and September, 1984 (one well), November, 1984 (nine wells), January, 1985 (forty-six wells), December, 1988 (twenty-four wells), January, 1991 (two wells), and March, 1993 (five wells). Details of the results of each of these sampling rounds are identified in a letter dated August 23, 1993, which was sent to everyone on the community relations mailing list for PRL. This letter has been included in the Administrative Record and is available for review at the Administrative Record locations at the Dayton-Montgomery County Public Library and U.S. EPA offices in Chicago, Illinois.

COMMENT:

It was said that there was an excessive cancer risk caused by showering in and drinking water from the monitoring wells in Eldorado Plat. How is Alternative 5 addressing this cancer risk?

RESPONSE:

The selected remedial action is Alternative 4. Alternative 4 will reduce risks posed by showering in and drinking water from monitoring wells in the Eldorado Plat area by extracting and treating leachate in the landfill and ground water from the shallow aquifer adjacent to the landfill. Leachate and ground water in the shallow aquifer are the sources of ground water contamination found adjacent to the landfill and south of the river in the Eldorado Plat area. Once these sources are removed and the landfill is capped, ground water contamination in the primary aquifer adjacent to the landfill and in the Eldorado Plat area will reduce and achieve ground water cleanup levels in an estimated 6 years.

II. PRP COMMENTS

CLEANUP LEVELS ( $10^{-4}$  to  $10^{-6}$  RISK RANGE)

COMMENT:

U.S. EPA OSWER Directive 9355.0-30 "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions" clearly states that if the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than  $1 \times 10^{-4}$ , and the non-carcinogenic hazard index (HI) is less than 1, action at the site is generally not warranted. In addition, the directive states "The upper boundary of the risk range is not a discrete line at  $1 \times 10^{-4}$ , although EPA generally uses  $1 \times 10^{-4}$  in making risk management decisions. A specific risk estimate around  $10^{-4}$  may be considered acceptable if justified based on site-specific conditions." This directive also states that the U.S. EPA should clearly justify the need for remedial action if baseline risks are within the acceptable risk range.

COMMENT:

In addition, the NCP states "for known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between  $10^{-4}$  and  $10^{-6}$  using information on the relationship between dose and response." (NCP, p. 8718).

The excess lifetime cancer risks did not exceed  $1 \times 10^{-4}$  for any future use (on-site resident) pathway evaluated. The total (summed) excess cancer risk through all future use pathways was calculated to be  $1 \times 10^{-4}$ , due primarily to incidental ingestion of on-site soil, inhalation of landfill emissions, and ingestion of

on-site groundwater (based on landfill liquid data). The HI value under future use conditions was slightly greater than 1 (3) for one future use pathway: ingestion of on-site groundwater. These exposure concentrations were calculated using landfill liquid data, allowing for hypothetical dilution into groundwater. The calculated HI value was exceeded for antimony. However, antimony has never been detected in groundwater.

Since risks calculated for the site indicate that risks fall within the acceptable risk range specified by the NCP, the additional remedial action required in Alternative 5 is clearly not warranted at PRL.

COMMENT:

The Proposed Plan (p.3) states that "Acceptable risks are those which may result in less than one additional cancer case in 1,000,000 [ $10^{-6}$ ]." As noted above, the NCP defines acceptable exposure levels as a cancer risk between  $10^{-4}$  and  $10^{-6}$ .

RESPONSE:

The above quote from U.S. EPA's OSWER Directive is accurate, but the selected quote is not complete enough to give the full context in which the statement was made. The first page of the Directive states "Where the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than  $10^{-4}$ , and the non-carcinogenic hazard quotient is less than 1, action generally is not warranted unless there are adverse environmental impacts. However, if MCLs or non-zero MCLGs are exceeded, action generally is warranted." As identified in section VI. A. 3. of the ROD, three of the 19 chemicals of concern in on-site ground water wells were detected at concentrations which exceed MCLs, and one of the 5 chemicals of potential concern in the Eldorado Plat monitoring wells exceeded MCLs (see Table 18 in ROD). The Agencies agree that Alternative 5 is not the best alternative to address and reduce risks posed by PRL. Alternative 4 is the selected remedial action and will best reduce risks to human health and the environment posed by PRL.

The above quote from the Proposed Plan is accurate, however, the Proposed Plan did not clearly explain the definition of acceptable risks. This issue is explained below and is clarified in the Record of Decision. The quote from the section NCP (page 8718) is accurate; however the NCP goes one step further in Section 300.430(e)(2) and identifies the  $10^{-6}$  risk level as the point of departure for determining remediation goals for alternatives when ARARs are not available or are not sufficiently protective of human health because of the presence of multiple contaminants at a site or multiple pathways of exposure. PRL has both multiple contaminants and multiple pathways of exposure. U.S. EPA believes it is necessary that when the aggregate risk of contaminants exceeds  $10^{-4}$ , or where remediation goals are not

determined by ARARs, U.S. EPA uses  $10^{-6}$  as a point of departure for establishing remediation goals. This means that a cumulative risk level of  $10^{-6}$  is used as the starting point (or initial "protectiveness" goal) for determining the most appropriate risk level that alternatives should be designed to attain. The use of  $10^{-6}$  is U.S. EPA's preference for remedial actions that reduce risks to the more protective end of the risk range, but this does not mean that a final remedial action should attain such a risk-based cleanup level.

Additionally, under current use conditions the excess lifetime cancer risks were within a  $10^{-6}$  to  $10^{-4}$  cancer risk range for six pathways and the excess lifetime cancer risks exceeded  $10^{-4}$  for one pathway. Under current use conditions, the hazard index value was greater than one for one pathway. Under future land-use conditions, the excess lifetime cancer risks were within a  $10^{-6}$  to  $10^{-4}$  cancer risk range for four pathways. The excess lifetime cancer risks exceeded  $10^{-4}$  for one pathway. Under future land-use conditions, the hazard index value was greater than one for one pathway. The Agencies believe the risks calculated for PRL do justify the need for remedial action of ground water from the shallow aquifer adjacent to the landfill.

At PRL, the Agencies have identified in the ROD that final cleanup levels for individual contaminants in all media will be chemical-specific ARARs (see Table 22 in ROD). If multiple contaminants are present in a media, and cleanup of individual contaminants to ARARs result in an cumulative risk in excess of  $10^{-4}$  across a media, cleanup levels of contaminants will be risk-based and cumulative cross a media to  $10^{-4}$  or less (see Table 21 of ROD). If chemical-specific ARARs do not exist for contaminants, cleanup levels of contaminants will be risk-based and cumulative across a media to  $10^{-4}$  or less (see Table 21 of ROD).

#### TREATMENT OF CONTAMINATED SOILS PRIOR TO CONSOLIDATION

##### COMMENT:

Under current use conditions, the excess lifetime cancer risks exceeded  $1 \times 10^{-4}$  ( $2 \times 10^{-3}$ ) and the HI was greater than 1 (6) for ingestion of uncooked fish caught from the backwater area of the Great Miami River. All other pathways (including soil ingestion) were within the acceptable risk range specified in the NCP. It is highly unlikely under reasonable maximum current use conditions that an individual would need or desire to subsist entirely on fish, let alone uncooked fish, from the backwater area for 350 days per year. The unreasonable nature of this assumption was noted by the Ohio EPA in the Public Meeting in Huber Heights on June 2, 1993. Risks associated with cooked fish fall within the acceptable risk range ( $5 \times 10^{-5}$ ,  $HI < 1$ ). In addition, the data used for this evaluation was based on a



simulation of contaminant migration by surface water runoff. Actual concentrations of constituents contributing to risk were not detected in the backwater area. This is clearly a case where a risk level around  $1 \times 10^{-4}$  may be considered acceptable. The consolidation and capping of "hot spot" soil would fully address concerns for potential contaminant migration by runoff into the backwater.

COMMENT:

Contaminants in on-site soil (PCBs and DDT) are generally immobile. General characteristics of PCBs and DDT include low solubility, low vapor pressure, and high octanol-water and organic carbon partition coefficients (EPA, 1990; Mackay et al., 1992). These characteristics indicate that both PCBs and DDT tend to accumulate and persist in soil. Low solubility tends to limit contaminant movement with water through soil. Low vapor pressure and high partition coefficients further indicate that PCBs and DDT in soil will tend to remain fixed in soil rather than partition to other media such as water or air.

RESPONSE:

The Agencies have reconsidered the necessity of treating contaminated soils prior to consolidation under the landfill cap. The Agencies have reviewed the information provided by the commenter, and consulted with Ohio EPA and U.S. EPA RCRA programs, and agree that treatment of contaminated soils prior to consolidation under the landfill cap will not provide additional protection of human health and the environment, nor provide any significant reduction of toxicity, mobility or volume. Accordingly, the selected remedial action no longer includes the treatment of contaminated soils prior to consolidation under the landfill cap.

During the public meeting in Huber Heights, Ohio, on June 2, 1993, the Ohio EPA did not imply that the risk calculations used to identify risks based on fish consumption were unreasonable. Ohio EPA did explain during the meeting how these risk calculations were conducted and the assumptions which are part of the calculation. The Agencies believe that the risk calculations used to identify risks based on fish consumption were reasonable because contaminated soil was identified around the landfill and a complete pathway for migration of soils to the river exists.

## RISK ASSESSMENT

COMMENT:

The risks estimated in the Baseline Risk Assessment do not reflect a reasonable estimate of site risk. The Baseline Risk Assessment performed by Clement International Corporation was prepared under U.S. EPA direction in accordance with Subpart E, Section 300.430(d) of the NCP. In general, the Baseline Risk

Assessment followed standard U.S. EPA national risk assessment methodologies and conservative assumptions.

Clement International Corporation was required to adhere to Region V policy for assessing future hypothetical exposures and risks to residents living on the PRL property. This Region V policy resulted in the use of maximum detected chemical concentrations on the site (for leachate, soil, and gas) as the basis of calculating hypothetical upper bound exposures and risks. The Region V policy has not been authorized by U.S. EPA Headquarters, and, in fact, is inconsistent with current U.S. EPA national Superfund risk assessment guidance, and U.S. EPA's proposed exposure-related measurement and final exposure assessment guidelines.

In its "Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (EPA/540/1-89/002, December 1989)," U.S. EPA states "... assuming long-term contact with the maximum concentration is not responsible" (p. G19). Nonetheless, that is precisely the effect of following the Region V policy which uses an implausible worst-case analysis as the only level of analysis.

The goal of risk assessment is to portray as accurately as possible the potential health risk, including the attendant uncertainties, associated with a particular set of exposures. Its purpose is not to conduct worst-case analyses for the sake of conservatism. As U.S. EPA cautioned in its "Proposed Guidelines for Exposure-related Measurements" (53 Federal Register 48830, December 2, 1988):

By maximizing the parameters in a scenario for exposure, the assessor is looking at the top end of the distribution of exposures in a population (if indeed the worst case actually exists in the population). A legitimate use of worst-case scenarios is to determine if the exposure or risk is low enough even at this extreme so as to dismiss concern for this scenario. It is not legitimate to use a worst-case scenario to prove that there in fact exists a concern in a real population. In constructing a worst-case scenario, the assessor has usually added assumptions or used particular data points that bring into question whether the scenario actually represents the real world. If the exposure or risk value estimated by a worst-case scenario is high enough to cause concern, the assessor must reevaluate the parameters used and perform reality checks before deciding a problem really exists. It is critical that the results of a worst-case individual scenario are not immediately applied to an entire population, since in almost all cases this will result in a substantial overestimate of a potential problem. (EPA, 1988a, p. 48846.)

Likewise, as U.S. EPA states in its recently published final "Guidelines for Exposure Assessment" (57 Federal Register 22888, May 29, 1992), regarding the true value of theoretical upper bounding estimates of exposure and risk:

... the only thing the bounding estimate can establish is a level to eliminate pathways from further consideration. It cannot be used to make a determination that a pathway is significant (that can only be done after more information is obtained and a refinement of the estimate is made), and it certainly cannot be used for an estimate of actual exposure (since by definition it is clearly outside the actual distribution). (EPA, 1992a, p. 22920.)

Research conducted by Clement International Corporation has demonstrated that the standard U.S. EPA "reasonable maximum exposure" (RME) methodology for groundwater routinely and unpredictably overestimates the true 95th percentile upper confidence limit of possible exposures and risks by 1 to 3 orders of magnitude (i.e., by 10 to 1,000 times) (Clement, 1990a.). In a significant number of cases, the U.S. EPA methodology gives RME concentrations that are physically impossible (i.e., greater than 1 million parts per million).

Therefore, the risk estimates presented in the Baseline Risk Assessment, and prepared in accordance with U.S. EPA methodologies and specifications as interpreted by Region V do not reflect the true or reasonable estimates of site risks, and that actual site risks would be considerably lower. Therefore, the additional remedial action required in Alternative 5 (as opposed to Alternative 3) is clearly not warranted at PRL.

COMMENT:

It is inappropriate to use maximum detected chemical concentrations as the basis for calculating hypothetical exposures and risk. In addition, calculating risk on the basis of exposure to an individual residing on the landfill in the future is unreasonable and inappropriate. U.S. EPA guidelines preclude the essential exposure scenario for a municipal landfill. See figure 2.4 of "Potential Conceptual Site Model for Municipal Landfills," EPA OSWER Directive 7355.3-11 February 1991. Moreover, residential exposure scenarios are irrelevant at sites which will have institutional controls, including deed restrictions, prohibiting such future development.

RESPONSE:

The Baseline Risk Assessment for PRL was prepared under the direction of a U.S. EPA Region V toxicologist.

This comment states that the U.S. EPA's direction in the preparation of the Risk Assessment resulted in an unreasonable estimate of site risk. The Agencies do not agree with this

determination. At the time the Risk Assessment was done for PRL, the RME scenario was evaluated as required by the Risk Assessment Guidance for Superfund (RAGS). The central tendency scenario, which presents the average risk and is used for the purpose of risk communication, was not calculated. The central tendency calculations were not required at that time; these calculations demonstrate the range of exposures which may be posed by the site, but they are not essential in a Risk Assessment because RME is used for remediation decisions. Remedial decisions cannot be executed at a level which leaves 50% of the population at risk.

RAGS was followed to establish acceptable default exposure parameter values for use in standardized intake equations. The comments address the exposure point concentrations used in the intake equations. Exposure point concentrations can represent a wide range of values if homogeneous sampling data was not obtained or hot-spots are present. When the upper 95% confidence limit is calculated, true detects are figured into the calculation along with non-detects. Sometimes, the calculated upper 95% confidence limit value exceeds the highest exposure. RAGS clearly states that when this happens, the maximum exposure concentration should be used instead of the hypothetically exaggerated 95% confidence limit value. However, RI sampling data may not have identified the highest concentrations of contamination on the Site, therefore the highest concentrations of contamination detected may not be the highest values present at the Site, and are not necessarily unreasonable.

Calculations were done in the Risk Assessment using the maximum concentration of contaminants detected in ground water. The average concentration of contaminants was not used, first, because U.S. EPA headquarters has not provided guidance to support this approach, and second, it is difficult to calculate what the average concentration of a ground water contaminant is. Factors such as localized, persistent pockets of ground water contamination and sample data which may not accurately reflect the highest concentrations present, make it difficult to calculate an average contaminant value. Multiple monitoring wells are not usually installed to determine the plume/pool concentrations of contaminants, but rather, monitoring wells are located to determine the boundaries of the contamination. U.S. EPA's Region V guidance uses 3-5 wells and averages the value of each contaminant detected in the wells if the values are relatively homogeneous. Obviously, if the values are not homogeneous any statistics generated will be skewed and will result in the use of the highest detected value for risk calculations. In cases where not much monitoring well data is available, Region 5 follows a policy which was developed by U.S. EPA - Region 3. The Region 3 policy evaluates specific areas of contamination and determines the risks involved with installing a well in these contaminated areas. This determination is based on an individual's potential exposure to the actual chemicals

present in the contaminated areas. This method was presented at U.S. EPA's risk assessment conference a few years ago and represents a reasonable approach.

The PRPs identify that calculating risk based on an individual residing on the landfill (future residential land use scenario) is unreasonable and inappropriate. The Agencies do not agree. Ground water contamination and landfill gases have the potential to migrate to adjacent property. Property adjacent to landfills can be sold to an individual who wishes to reside on the property. This individual may even install a well for potable water. (There are residences around Powell Road Landfill.) The potential exists that an individual could be exposed to the various contaminants found at the Site.

The Agencies do not agree that residential scenarios are irrelevant at sites which will have institutional controls. Risk assessment is separate from and does not involve risk management (i.e. the determination to implement institutional controls). A risk assessment examines the contamination found at a Site, and the potential for human exposure to the contamination. A determination is made as to whether or not this exposure presents a risk. The purpose of Risk Assessment is to present an unbiased, scientific evaluation of the Site and the risks it might pose. Once the risks have been determined, one can decide how to address the risks (risk management), for example if an institutional control can be used. The decision to utilize institutional controls is not made first, followed by determination of the risks.

Figure 2.4 identified in this comment is from the U.S. EPA guidance "Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites". This guidance document presents procedures which can be used to expedite risk management decisions at a site; however, it also specifies (Section 3.7, pp 3-37 through 3-40) that a full (quantitative) risk assessment is necessary to demonstrate that the full remedy is protective of human health and the environment. U.S. EPA is still required to conduct a Risk Assessment, develop risk calculations, and then make risk management decisions and develop a remediation strategy for the Site.

The Agencies do not agree that Alternative 3 would be protective of human health and the environment because Alternative 3 does not actively address existing ground water contamination in the shallow aquifer adjacent to the landfill. Ground water in this aquifer exceeds MCLs, exhibits unacceptable risks to human health, and warrants remediation under the selected remedial action. The Agencies identify Alternative 4 as the selected remedial action in the ROD. Alternative 4 differs from Alternative 5 (the preferred alternative in the Proposed Plan) in the ground water component. Specifically, Alternative 4 extracts

and treats ground water from the shallow aquifer adjacent to the Site, while Alternative 5 also extracted ground water from the primary aquifer adjacent to the Site. By extracting leachate from the landfill and ground water from the shallow aquifer adjacent to the landfill, the Agencies believe the sources of ground water contamination in the primary aquifer adjacent to the landfill and south of the river in the Eldorado Plat area will be addressed. Contamination in the primary aquifer is expected to decrease and achieve cleanup levels in an estimated 6 years.

COMMENT:

Ohio EPA Deputy Director, Jennifer Tiell, was quoted in the Columbus Dispatch on June 15, 1993, as saying: "U.S. EPA has typically regulated from the worst-case scenario." "I think Ohio and a lot of states have been saying, 'We've got a lot of good data now. We shouldn't have to regulate [sic] from the worst case.'"

RESPONSE:

The opinions of the Ohio EPA's Acting Deputy Director have no direct bearing on the determinations of risks at Superfund Sites in general or the Powell Road Landfill Superfund Site, in particular. The determinations of risks at PRL were made properly based on existing guidance (including the Risk Assessment Guidance for Superfund (RAGS) and regional policy), and in consultation with U.S. EPA Region V toxicologists. U.S. EPA and Ohio EPA have jointly selected Alternative 4 as the appropriate remedial action to address contamination and reduce risks at PRL.

GROUND WATER DEGRADATION

COMMENT:

Alternative 3 complies with federal and state applicable or relevant and appropriate requirements (ARARs). Implementation of Alternative 5 may result in non-compliance with ARARs, by actually degrading groundwater quality in the primary aquifer and resulting in non-compliance with ARARs.

In addition, Alternative 5 may not comply with Ohio anti-degradation laws since the groundwater extraction system will compromise the effectiveness of the leachate extraction system and may subsequently degrade on-site aquifers.

COMMENT:

Alternative 3 may achieve a higher degree of long-term effectiveness than Alternative 5. The groundwater extraction system in Alternative 5 will compromise the effectiveness of the leachate extraction system (primary source control element) and may result in groundwater impacts that would require long-term management.

COMMENT:

Alternative 3 may achieve a higher degree of long-term effectiveness than Alternative 5 as the additional source controls in Alternative 5 will compromise the effectiveness of the primary source control element (leachate extraction system) and may subsequently degrade the quality of on-site aquifers. All three extraction systems (leachate, shallow aquifer, and primary aquifer) are dynamic and interconnected. Pumping from the shallow aquifer will induce flow from the landfill. Pumping from the primary aquifer will induce flow from both the shallow aquifer and the landfill.

The leachate levels in the landfill are higher than the groundwater levels, therefore, a potential exists for downward migration from the landfill into the aquifer. When the landfill cap is added the leachate level will decrease, and the vertical downward gradient will decline. This will reduce the potential for leachate to escape the landfill. When the cap is in place and the gas/leachate extraction wells are operating, the leachate level will decline below the groundwater level. Because the groundwater level will then be higher than the leachate level, the flow potential is upward and into the landfill. When the flow potential is inward, leachate will not leave the landfill and enter the groundwater system, as noted in the Proposed Plan (p.7).

The groundwater pumping in Alternative 5 will lower the groundwater levels in the vicinity of the landfill to below the leachate levels in the landfill. This will create a downward potential for flow thereby allowing leachate to enter the groundwater system. The leachate extraction system would therefore no longer provide effective source control. Pumping both the shallow and primary aquifers will also create a head gradient between the shallow and primary aquifer, creating a downward potential for flow from the shallow to the primary aquifer. Therefore, leachate that is no longer contained by the leachate extraction system can be induced downward into the shallow and primary aquifer as a result of pumping groundwater. Clearly, the additional source controls in Alternative 5 may actually degrade the aquifers and result in unnecessary long-term management. In fact, it is possible that once the aquifers' quality are degraded that they will never be restored.

It should also be noted that potential degradation of aquifers is not recommended by U.S. EPA, as shown by the following citation. "Since it is EPA's goal to restore groundwater to its beneficial uses, the Superfund program would rarely propose a pump-and-treat remedy that would degrade pristine or only slightly contaminated water." (ARARs Qs & As: State Ground-Water Antidegradation Issues, Publication 9234.2-11/FS, July 1990).

**COMMENT:**

Existing conditions show that there are no VOCs or other compounds above MCLs in groundwater adjacent to the landfill. Pumping the aquifer systems (Alternative 5) adjacent to the landfill will increase the potential for contaminants to move from the landfill into the groundwater system, increasing toxicity, mobility, or volume (TMV) in the aquifers compared to either existing conditions or after implementation of Alternative 3.

**RESPONSE:**

Based on the above comments regarding negative interaction of the leachate and ground water extraction systems, the Agencies consulted technical experts for assistance with the above issues regarding possible degradation of ground water if the alternative selected in the Proposed Plan was implemented at PRL.

One issue which is contradictory in this comment is the interaction of leachate and ground water. Leachate and ground water are not two separate systems but are interconnected. The leachate levels will not decline below the ground water levels, because they are not separate from each other.

Using the information in the FS, calculations were done to estimate drawdown of the water table based on extraction of ground water from the shallow and primary aquifers. Calculations for the shallow aquifer used information in the FS; the estimated 10 ground water extraction wells in the shallow aquifer, a total discharge of 900,000 gpd, hydraulic conductivity of 500 ft/day, and assuming no contribution of water from the river (very conservative assumption). Drawdown at a radial distance of 100 feet from the ground water wells was calculated to be an estimated .66 feet. Drawdown at the site boundary is less-than 1 foot (it would actually be smaller due to the interaction of the river). If leachate extraction wells were affected, it would only be the leachate extraction wells closest to the southern boundary of the landfill, and pumping systems in ground water wells could be adjusted as necessary.

The same calculations were done with information in the FS on the extraction of ground water from the primary aquifer. Using a discharge of 500,000 gpd, transmissivity of 20,000 and no expected contribution from the river (very conservative), drawdown at a radial distance of 100 feet from extraction wells is 4 feet. Drawdown at 1,500 feet were less-than 1 foot. Therefore, extraction of ground water from the primary aquifer could increase downward migration of contamination into the primary aquifer, except where the confining layer would limit vertical migration.

Therefore, the Agencies partially agree with this comment. Extraction of ground water from the primary aquifer adjacent to



the landfill could increase downward migration of ground water and cause further contamination in the primary aquifer, except where the confining till layer would limit vertical migration.

Based on this information, the Agencies determined that it would not be appropriate to extract ground water from the primary aquifer adjacent to the landfill as detailed in Alternative 5. Rather, Alternative 4 has been selected. The ground water component of Alternative 4 includes the extraction of ground water from the shallow aquifer adjacent to the landfill. Based on the above calculations, ground water extraction from the shallow aquifer adjacent to the landfill should not interfere with the leachate extraction system.

#### NATURAL ATTENUATION

##### COMMENT:

Alternative 3 will meet all pertinent state (Ohio Administrative Code and Ohio Revised Code) and federal ARARs (Clean Air Act and Clean Water Act ARARs are covered by matching state regulations in Ohio) for solid waste landfill closure and gas/leachate management. U.S. EPA specifically states on Pages 12 and 13 of the Proposed Plan that Alternative 3 will comply with all ARARs. Therefore, the additional remedial action required by Alternative 5 is not justified to provide ARAR compliance.

Maximum Contaminant Levels (MCLs) set under the Safe Drinking Water Act (SDWA) have not been exceeded on-site since April 1989 (Table 1; Figure 1) indicating that contaminant reduction and ARAR compliance has already occurred at the site by natural attenuation. On-site groundwater extraction and treatment is, therefore, not justified for ARAR compliance, and Alternative 5 is unnecessary.

##### COMMENT:

Groundwater quality trends show that residual VOC concentrations in on-site groundwater are naturally attenuating. Table 1 presents a summary of VOC detections, and Figure I shows the distribution of VOC detections in March 1993. Total VOC concentrations in the shallow aquifer on-site have declined or, at the very least, remained level from December 1988 to the present (Figure 6). Not only have the total VOC concentrations decreased, but the individual MCLs that were exceeded in December 1988 or April 1989 have not been exceeded since April 1989 (Figures 7 to 13).

VOCs in the primary aquifer on-site also show a declining trend (Figure 14). There has only been one location directly downgradient (MW04B; MW04BR) where VOCs have been detected (Figure 15). A 1 ug/l (J) (J=estimated) value was detected at MW03B, but a duplicate sample had no detection (Figure 16). A 1 ug/l (J) Value was also detected at MW06B in one sampling event

(Figure 17), but MW06B is not directly downgradient of the landfill. MCLs have never been exceeded in the primary aquifer. Natural attenuation has been responsible for the decreased VOC concentrations that previously had been released from the landfill and, therefore, provides reduction of TMV. The improved cap and leachate control provided by Alternative 3 will continue to provide reduction of TMV in groundwater. Also, groundwater monitoring will be used to track groundwater quality trends.

**RESPONSE:**

When the Agencies stated in the Proposed Plan that Alternative 3 will comply with all ARARs, we believed that risks associated with ground water contamination would be reduced by natural attenuation.

However, based on the above comments, the Agencies consulted with U.S. EPA technical staff and requested review of the supporting documents and the data presented by the commenter supporting the above statements. The information provided to the Agencies in the comment letter included figures on ground water quality trends. This information does not prove natural attenuation is occurring at PRL. The trends are not consistent, and the data acquisition is spaced too far apart to support the statement that natural attenuation is occurring at PRL. Temporary shifts in flow directions due to pumping or seasonal variations could cause these reductions in ground water contamination.

The information provided to the Agencies by the commenter does not support the statement that natural attenuation will address all existing ground water contamination in a time-frame comparable to extracting and treating ground water. Ground water modelling, a tool which could support the statement that natural attenuation of ground water contamination may occur, was not done at PRL. Additionally, information about numerous conditions in the aquifer, which must be within certain parameters, the balance of these parameters, and concentrations of contaminants in the ground water, are all necessary to evaluate if natural attenuation can or will occur. None of this information was provided to the Agencies to support the statement that natural attenuation will address existing ground water contamination at PRL, in a time-frame comparable to extracting and treating ground water.

Therefore, the Agencies do not agree with the commenter that natural attenuation is occurring or can occur at PRL.

The U.S. EPA's nine criteria includes the "Reduction of toxicity, mobility, or volume (TMV) through treatment". Alternative 3 does not reduce TMV through treatment.

## GROUND WATER EXTRACTION AND TREATMENT

### COMMENT:

The additional contaminant mass treated by the Alternative 5 additional source controls is insignificant when compared to the mass addressed by removal and treatment of leachate and gas by Alternative 3.

### COMMENT:

As detailed in the FS (Appendix E, pp E-8 and E-9), it is estimated that the additional source controls of Alternative 5 (ground water extraction from the shallow and primary aquifers adjacent to the landfill and treatment on-site) would only result in an increase in volatile organic mass removal from groundwater of only 10 percent. This increase is not significant. Therefore, the additional remedial action required under Alternative 5 is clearly not justified since no significant reduction in TMV will occur with implementation of this alternative.

### RESPONSE:

The additional remediation in Alternative 4 of the shallow aquifer adjacent to the landfill is justified. MCLs were exceeded and unacceptable risks to human health and the environment are present in the shallow aquifer adjacent to the landfill. Extraction and treatment of leachate and ground water in the shallow aquifer adjacent to the landfill will address these risks and achieve ARARs. By extracting and treating the leachate in the landfill and ground water in the shallow aquifer adjacent to the landfill, the two sources of ground water contamination in the primary aquifer, both adjacent to the landfill and south of the river (Eldorado Plat area), ground water risks posed to human health and the environment will reduce and cleanup levels will be achieved.

## ELDORADO PLAT MONITORING WELL CONTAMINATION

### COMMENT:

The Proposed Plan (p.11) states that "Groundwater contamination in the primary aquifer, adjacent to the landfill, is the probable source of groundwater contamination south of the river." "South of the river" should be "in Eldorado Plat" as stated on Page 4 of the Proposed Plan.

### RESPONSE:

The commenter is correct. The Proposed Plan did not clarify throughout the document that "ground water south of the river" meant "ground water south of the river in the Eldorado Plat area". The ROD clarifies this issue.

COMMENT:

The Proposed Plan (p.14) states "Alternative 5 utilizes treatment to reduce TMV of groundwater in the shallow and primary aquifers adjacent to the landfill, which will reduce TMV of groundwater contamination south of the river." As noted previously, there is no evidence to suggest that groundwater extraction at the site will reduce TMV of groundwater contamination in Eldorado Plat.

COMMENT:

The additional source control in Alternative 5 is designed to address VOC concentrations in the Eldorado Plat area and there is no evidence that PRL is the source of Eldorado Plat concentrations.

The Proposed Plan states that groundwater contamination in the primary aquifer adjacent to the landfill is the probable source of groundwater contamination in the Eldorado Plat Area (Proposed Plan, page 8). The primary aquifer adjacent to the landfill is not the source of contamination in the Eldorado Plat area, as discussed below, and as demonstrated in the RI.

The type and extent of groundwater contamination adjacent to PRL is limited to sporadic occurrences of low VOC concentrations. The only significant VOC detection in the primary aquifer has been 1,1-dichloroethane (DCA) ("ethane"-type VOC), and this has only been detected at the MW04B location. Chloroethane and chlorobenzene have been detected in low concentrations at MW04B (and MW04BR). No other VOC has been detected at any other on-site primary aquifer wells in four sampling events from December 1988 to March 1993 tetrachloroethene (PCE), was detected at a 1 ug/l (J) concentration one time at MW03B; however, a duplicate analysis indicated no detection). There has never been an MCL exceedance in the primary aquifer at PRL.

The VOCs detected south of the Great Miami River in the Eldorado Plat area are "ethene"- type VOCS. They have been detected only in the primary aquifer in low concentrations. MCLs have been only slightly exceeded at two monitoring wells and never at a residential well. Only three wells out of 20 monitoring and residential wells in Eldorado Plat have ever had any VOCs detected. There is no evidence to suggest that the "ethane"-type compounds detected in the primary aquifer at the site are related to the "ethene" compounds detected in the Eldorado Plat area.

In addition, there is insufficient evidence to conclude that contaminants found in Eldorado Plat are degradation products of PRL contaminants. If biodegradation was occurring as the contaminated groundwater migrates downgradient, one or more of the following transformation pathways would be expected (Dragun, J., The Soil Chemistry of Hazardous Materials, Hazardous Materials Control Research Institute, 1988):

1,1,1-TCA --> 1,1-DCA  
PCE --> TCE --> 1,2-DCE  
PCE --> TCE --> 1,1-DCE --> 1,1-DCA

1,1-DCA was detected in the primary aquifer adjacent to PRL while trichloroethene (TCE) and 1,2-dichloroethene (DCE) were detected in the primary aquifer in Eldorado Plat. TCE and 1,2-DCE are not degradation products of 1,1-DCA.

Also, if biodegradation was occurring, TCE would not be expected to be persistent in Eldorado Plat if PRL was the source, given its short biodegradation half-life and the low levels of TCE and PCE (TCE is a degradation product of PCE) detected at PRL.

Inorganic constituents in groundwater characteristic of contamination from landfill leachate are found in slightly elevated concentrations in the shallow groundwater system adjacent to PRL. These constituents include bicarbonate, chloride, sulfate, potassium, iron, and calcium. These constituents are slightly higher than upgradient or background values at the shallow on-site wells MW02A, MW03A, MW04A, MW07A, and MW4S. The concentrations of these constituents in the on-site primary aquifer wells and the shallow and primary Eldorado Plat monitoring and residential wells are within background ranges. This is further evidence that PRL is not the source, of VOCs in the Eldorado Plat area.

The trend of chloride levels in the three primary aquifer wells at the landfill identifies that only upgradient well MW12C shows an increasing trend in chloride levels. Downgradient wells, MW02B and MW04B, exhibit a level and possibly a very slight decreasing trend. The levels at MW04B appeared to have had an upward trend from about 1983 to December 1988, then a downward trend is apparent.

Trends of specific conductance measurements of on-site shallow and primary aquifer wells show that specific conductance levels have remained relatively level. The values are much more erratic in the shallow aquifer due to the influence of the Great Miami River recharging or discharging to the shallow zone. The values in the primary aquifer are much more stable and show that there has been no overall increase in specific conductance. If there were a leachate plume developing or becoming better defined, the specific conductance values would be expected to be increasing, which they are not.

COMMENT:

There is significant evidence to suggest that there are other possible sources of the Eldorado Plat sporadic VOC concentrations. There are several areas of past waste disposal within and adjacent to Eldorado Plat that are closer to Eldorado Plat than PRL. The levees constructed south of the river and the

areas around the levees have considerable amounts of visible refuse, debris, and automotive parts and were reportedly originally constructed with hospital demolition fill.

Previous studies have also identified other potential sources of VOCs in the area of Eldorado Plat. The "Phase I Miami North Well Field Environmental Testing and Development Program," prepared for the City of Dayton by CH2M Hill in January 1988, identified many potential sources, including:

Potential Source	Location	Description
Eldorado Plat	South Side of GMR	Discarded Drum Contents/WWII Site
Gravel Pit Dump Site	West of PRL	Former Dump Site

The CH2M Hill study also identified evidence of dump sites and various junk piles in the Eldorado Plat area in 1965 aerial photographs.

Aerial photographs of the area clearly show vehicles, junk, debris, and other materials on the north side of Eldorado Plat in the 1960s and early 1970s. Also, SCA observed stacks of drums in Eldorado Plat last year at a residential location, and at least one of the houses in Eldorado Plat is currently a workshop for appliance repair.

The evidence suggests that these locations adjacent to Eldorado Plat are potential sources of VOCs in groundwater south of the Great Miami River. In fact, TCE is a commonly used solvent and diluent and is used for degreasing metal and electronic parts and in anesthetics and medicine. 1,2-DCB is also a commonly used solvent and is used as a refrigerant. These compounds were found in Eldorado Plat groundwater but were not found in PRL groundwater. Therefore, it is highly probable that these other potential sources are the source of VOCs in Eldorado Plat groundwater.

There is evidence of other sources of VOC concentrations in Eldorado Plat, whose remediation is not the responsibility of SCA or the PRL Potentially Responsible Parties (PRPs).

#### RESPONSE:

The Agencies consulted with technical staff at Ohio EPA, on the issue of contamination migrating from PRL to the Eldorado Plat area. Originally the Agencies believed that leachate from the landfill was migrating into the shallow aquifer adjacent to the landfill, then vertically into the primary aquifer adjacent to the landfill and then horizontally to the primary aquifer in the

Eldorado Plat area. However, this theory does not explain how contamination was identified in monitoring wells in the Eldorado Plat area, both above and below the discontinuous till layer. Discussions with technical staff and review of information in the RI identified that the Great Miami River (GMR) is shallow, and the GMR's influence on (i.e. discharge to) the shallow aquifer is probably minimal at times. Therefore, the GMR is not necessarily a barrier to ground water contaminant migration under the river, to the Eldorado Plat area. Contamination from the shallow aquifer adjacent to the landfill could be migrating under the GMR to the Eldorado Plat area, immediately south of the GMR. Therefore, the source of the contamination in the Eldorado Plat area is most likely the shallow aquifer adjacent to the landfill. This source is addressed by Alternative 4 through extraction and treatment of the shallow aquifer adjacent to the landfill.

Although the "ethene" contamination found in the Eldorado Plat area ground water appear not to be related to the mainly "ethane" compounds found in ground water adjacent to the landfill, the RI did identify "ethenes" in the landfill gas vents (PCE, TCE), landfill liquids (DCE), and in the shallow aquifer adjacent to the landfill (DCE). This means that the "ethenes" found in ground water in the Eldorado Plat area could be the result of contamination migrating from PRL. Although TCE was found in ground water in the Eldorado Plat area and TCE was not found in ground water adjacent to the landfill, TCE could have migrated from the PRL. Methane, which is present in the landfill, can act as a catalyst to degradation of VOCs. Therefore the "ethenes" adjacent to the landfill could be degrading faster than "ethenes" which have migrated to the Eldorado Plat area. Which is why the lower degradation products of "ethenes" are found in ground water adjacent to the landfill (DCE) and the higher "ethene" degradation products (TCE) are still present in the Eldorado Plat area.

Information presented by the commenter on inorganic constituents in ground water and trends of chloride levels and specific conductance do not conclusively support the above comment. U.S. EPA's technical staff reviewed this information and determined that the trends are not consistent, and the data acquisition is spaced too far apart to support the conclusions.

The Agencies acknowledge that there is a possibility that other sources for the contamination identified in Eldorado Plat exist. However, RI data identifies ground water contamination between PRL and the Great Miami River and immediately south of the GMR in Eldorado Plat. The Agencies believe that the data identifies PRL as the source of ground water contamination in the Eldorado Plat area.

## IMPLEMENTABILITY

### COMMENT:

Alternative 3 is readily implementable, while the additional source controls (on-site groundwater extraction and treatment) in Alternative 5 may be difficult to operate, maintain and monitor because of the close proximity of the Great Miami River and the potential for flooding.

### RESPONSE:

The Agencies disagree with this comment. Ground water extraction and on-site treatment of ground water are proven and often used technologies for addressing ground water contamination at Superfund sites. These technologies should not be difficult to operate, maintain or monitor. The extraction wells will be designed to prevent interference in case of flooding. The ground water treatment system will be on-site, on the north side of the landfill, close to Powell Road, and should not be affected in case of flooding.

## COST-EFFECTIVENESS

### COMMENT:

According to the NCP, U.S. EPA believes that cost is a relevant factor for consideration as part of the selection of the remedy from among protective, ARAR-compliant alternatives, and not merely as part of the implementation phase.

Alternative 5 does not provide an incremental benefit over Alternative 3 because the increase in cost for additional source controls (estimated at a minimum of an additional \$6 million but could be as high as \$38 million) in Alternative 5 does not provide an incremental increase in the mass of compounds treated.

CERCLA, at section 121(a), states that "the President shall select appropriate remedial actions ... which are in accordance with this section and, to the extent practicable, the national contingency plan, and which provide for cost-effective response." Thus, cost-effectiveness is established as a condition for remedy selection, not merely as a consideration during remedial design and implementation. Further in the statute, at section 121(b)(1), Congress again repeats the requirement that only cost-effective remedies are to be selected, as follows: "The President shall select a remedial action that is protective of human health and the environment, that is cost effective, and that utilizes permanent solutions and alternative treatment ... to the maximum extent practicable." Therefore, cost-effectiveness is similar to the threshold criteria (protection of human health and the environment and compliance with ARARS) in that it is a statutory requirement with which an alternative must comply in order to be eligible for selection as the remedy.



The actual cost of Alternative 5 may be significantly higher than the FS and Proposed Plan estimates due to the actual extracted quantity of groundwater required for containment and due to the need to treat naturally-occurring compounds to achieve surface water discharge limits. In addition, most of the water extracted from the shallow wells will be induced from the river thereby requiring treatment of large quantities of groundwater with potentially nondetectable concentrations of compounds of concern. In addition, as previously stated, pumping groundwater from the aquifers will induce leachate flow from the landfill and may subsequently contaminate the aquifers with compounds which would require additional treatment. As a result, groundwater extraction and treatment could result in additional costs of as high as \$38 million compared to Alternative 3.

As discussed above, it is estimated that the additional source controls of Alternative 5 would only result in an increase in VOC mass removal of 10 percent. The additional cost of Alternative 5 compared to Alternative 3, estimated from \$6 to \$38 million, would represent an increase in cost of between 35 and 224 percent. The \$6 million represents the cost difference between Alternatives 3 and 5 using costs developed in the FS. Since the FS, additional cost estimates were performed to evaluate potential impacts on costs due to the potential degradation of aquifer quality by implementation of Alternative 5. These cost estimates indicate that there is a potential \$38 million cost increase. Clearly, Alternative 5 does not provide an incremental benefit over Alternative 3.

Alternative 5 is not cost-effective and, therefore, does not comply with this statutory requirement.

**RESPONSE:**

The NCP identifies in 300.430(f)(1)(ii)(D) that each remedial action selected shall be cost-effective, provided that it first satisfies the threshold criteria (protective of human health and the environment and attain or waive ARARs). Cost-effectiveness is one of the five balancing criteria (long-term effectiveness and permanence, reduction of toxicity, mobility, or volume (TMV) through treatment, short-term effectiveness, and implementability), to determine overall effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost-effective. A remedy shall be cost-effective if its costs are proportional to its overall effectiveness (NCP 300.430 (f)(1)(ii)(D)).

Alternative 4 reduces TMV through treatment of leachate from the landfill and ground water from the shallow aquifer adjacent to the landfill. The mass of compounds treated by Alternative 4 will not be very different from Alternative 3 because the leachate treatment component will produce the majority of the mass of compounds generated by the remedial action. The Agencies

believe that treatment of ground water in the shallow aquifer adjacent to the landfill is necessary to address and reduce ground water risks and provide overall protection to human health and the environment and provide long-term effectiveness and permanence. The selected remedy is implementable. Potential adverse short-term risks (short-term effectiveness) posed to on-site workers will be controlled by implementation of engineering controls.

The cost difference between Alternative 3 and Alternative 4 is \$3.69 million. Alternative 4 provides additional long-term effectiveness and permanence, provides overall protection to human health and the environment, and reduces TMV through treatment by extracting and treating leachate from the landfill and ground water from the shallow aquifer adjacent to the landfill. By extracting and treating leachate and ground water from the shallow aquifer adjacent to the landfill, Alternative 4 will address the two sources of ground water contamination present at PRL. The Agencies believe that the additional costs to provide additional overall effectiveness is cost-effective.

#### CONSISTENCY WITH OTHER SITES' RODS

##### COMMENT:

Implementation of Alternative 5 is inconsistent with remedies selected for numerous similar sites.

The selection of groundwater extraction and treatment at PRL (as in Alternative 5) is not being applied consistently by U.S. EPA and the State of Ohio. At similar Superfund landfill sites, U.S. EPA did not recommend groundwater extraction and treatment.

##### RESPONSE:

Every Superfund site is different and it is not appropriate to compare the Powell Road Landfill Superfund Site to other Superfund Sites in the Region or nationally. One unique aspect of PRL is that the Great Miami River buried valley aquifer, which underlies PRL, is a sole-source aquifer for drinking water for the City of Dayton. This sole-source aquifer was a major factor in the decision of the ground water remedial action for PRL.

#### SHORT-TERM EFFECTIVENESS

##### COMMENT:

The Proposed Plan (p. 16) states "The timeframe to achieve protection with Alternative 5 is estimated at 5 to 6 years, which is the shortest timeframe estimated for any alternative (Alternatives 3, 4, and 5 each had a 5- to 6-year estimated timeframe)". The Plan should state that Alternatives 3, 4, and 5 all are estimated to achieve protection in 5 to 6 years. The Plan should not imply Alternative 5 has the shortest timeframe.

**RESPONSE:**

The Agencies identified in the Proposed Plan that Alternatives 3, 4 and 5 all have 5-6 year time frames to achieve protection. The commenter is correct. The Proposed Plan should have clearly stated that Alternatives 3, 4, and 5 all have the same estimated timeframe to achieve protection.

**LONG-TERM EFFECTIVENESS**

**COMMENT:**

The Proposed Plan (page 13), states that Alternative 3 will provide long-term effectiveness and permanence by eliminating the source for future ground water contamination.

**RESPONSE:**

The Proposed Plan did state that Alternative 3 will provide long-term effectiveness and permanence. The FS supports this statement by identifying that natural attenuation of existing ground water contamination will occur. U.S. EPA's technical staff reviewed the RI, FS, Proposed Plan, and public comments, to determine if natural attenuation is already occurring at PRL. The information provided to the Agencies in the comment letter included figures on ground water quality trends. This information does not prove natural attenuation is occurring at PRL. The trends are not consistent, and the data acquisition is spaced too far apart to support the statement that natural attenuation is occurring at PRL. Temporary shifts in flow directions due to pumping or seasonal variations could cause these reductions in ground water contamination.

The information provided to the Agencies by the commenter does not support the statement that natural attenuation will address all existing ground water contamination in a time-frame comparable to extracting and treating ground water. Ground water modelling, a tool which could support the statement that natural attenuation of ground water contamination may occur, was not done at PRL. Additionally, information about numerous conditions in the aquifer, which must be within certain parameters, the balance of these parameters, and concentrations of contaminants in the ground water, are all necessary to evaluate if natural attenuation can or will occur. None of this information was provided to the Agencies to support the statement that natural attenuation will address existing ground water contamination at PRL, in a time-frame comparable to extracting and treating ground water.

Therefore, the Agencies do not agree with the commenter that natural attenuation is occurring or can occur at PRL.

The selected remedial action will address the two sources of ground water contamination at PRL; leachate in the landfill and ground water in the shallow aquifer. Therefore, although

Alternative 3 may provide long-term effectiveness and permanence once ground water cleanup levels are achieved, it does not directly address one of the sources of ground water contamination; the shallow aquifer adjacent to the landfill.

#### GENERAL COMMENTS

##### COMMENT:

Alternative 3 will comply with all of the NCP requirements, accomplish the necessary protection and cleanup in the same time as Alternative 5, and is significantly more cost-effective.

##### COMMENT:

Alternative 3 provides protection of human health and the environment by controlling the source. The additional source control provided by Alternative 5 does not provide additional protection.

##### RESPONSE:

The Agencies do not agree with this comment. As discussed in the ROD, section X., the Agencies believe that Alternative 4, the selected remedial action, is the best alternative to protect human health and the environment, will comply with ARARs and is cost effective. The selected remedial action utilizes permanent solutions and treatment technologies to reduce toxicity, mobility, or volume of the sources of ground water contamination adjacent to PRL.

U.S. EPA ADMINISTRATIVE RECORD  
 POWELL ROAD LANDFILL  
 MONTGOMERY COUNTY, OHIO  
 ORIGINAL  
 04/29/93

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3	00/00/00	U.S. EPA		National Priorities List Site: Powell Road Landfill (Description and Background)	1
4	00/00/00	[State of Ohio]		Powell Road Landfill Closure Requirements	1
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8	04/02/71	Kramer, A., Southeast District Office	Barger, F., Powell Road Landfill	Letter Forwarding a Data Sheet From the Southeast District Office	2
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NO.	DATE	AUTHOR	RECIPIENT	TITLE DESCRIPTION	PAGES
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POWELL ROAD LANDFILL SITE  
MONTGOMERY COUNTY, OHIO  
UPDATE #1  
09/17/93**

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13	06/17/93	Haynam, D., Fuller & Henry	Kimbrough, D., U.S. EPA	General Motors Corporation's Request for an Extension of the Comment Period on the Proposed Plan Through July 19, 1993	3
14	06/17/93	Barriball, T. and Green, R., Fugro-McClelland	Kimbrough, D., U.S. EPA	Miami Valley Landfill Coalition's Comments on the Proposed Plan	3
15	06/21/93	Garypie, C., U.S. EPA	Haynam, D., Fuller & Henry	Letter re: U.S. EPA's Extension of the Public Comment Period for the Proposed Plan Through July 9, 1993	1



U.S. EPA ADMINISTRATIVE RECORD  
 POWELL ROAD LANDFILL SITE  
 MONTGOMERY COUNTY, OHIO  
 UPDATE #2  
 09/29/93

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1	06/29/90	Arnett, K. and Shump, K., CH2M Hill	Alvey, M., Ohio Suburban Water Company	Draft Technical Memorandum re: Travel Time Analysis	15
2	07/24/92	City of Dayton	OhioEPA	General Plan for the Phased Development of the City of Dayton Rip Rap Road Well Field	10
3	01/06/93	Severyn, S., OhioEPA	OhioEPA	Report on the General Plan for the Phased Development of the City of Dayton Rip Rap Road Well Field	10
4	08/24/93	Schregardus, D., OhioEPA	City Manager, City of Dayton	Letter re: the City of Dayton's General Plans of Phased Development of the Rip Rap Road Well Field	2
5	08/11/93	Bartlett, J., U.S. EPA	Dumouchelle, D., U.S. EPA	Letter re: Ground Water Issues	3
6	08/30/93	Bartlett, J., U.S. EPA	File	Memorandum re: PRL Ground Water Issues	3
7	09/22/93	Allen, M. and Gibbons, A., OhioEPA	Bartlett, J., U.S. EPA	Facsimile of OhioEPA's Inter Office Communication re: SCA Services Comments on the Proposed Plan	8
8	09/22/93	Bartlett, J., U.S. EPA	File	Memorandum re: the August 26 and 27, 1993 Meeting with OhioEPA	2
9	09/28/93	Hindall, Steven, U.S. DOI	Bartlett, J., U.S. EPA	Letter re: the U.S. Geological Survey's Technical Assistance on Hydrogeological Issues	5



State of Ohio Environmental Protection Agency

P.O. Box 1049, 1800 WaterMark Dr.  
Columbus, Ohio 43208-0149  
(614) 844-3020  
FAX (614) 844-2329

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To	Jan Bartlett	From	C. Stroup
Co	U.S. EPA	Co	O EPA
Dept.		Phone	(614) 644-3037
Fax	(312) 353-5541	Fax	

V. Voinovich  
Governor  
Schregardus  
Director

September 30, 1993

RE: POWELL ROAD LANDFILL  
MONTGOMERY COUNTY, OHIO  
RECORD OF DECISION

*Val*  
Mr. Valdem V. Adamkus  
Regional Administrator  
U.S. EPA, Region V  
77 West Jackson Boulevard  
Chicago, Illinois 60604

Dear Mr. Adamkus:

The Ohio EPA has received and reviewed the Record of Decision (ROD) for the Powell Road Landfill (PRL) Superfund Site in Montgomery County, Ohio. Ohio EPA concurs with the selection of Alternative 4 for remedial action at this site. The selected remedial action presented in the ROD differs from the preferred remedial alternative outlined in the proposed plan. The selected remedial action, Alternative 4, includes the following components:

- institutional controls;
- improved landfill cap with liner;
- excavation of contaminated soils;
- consolidation of excavated soils under landfill cap;
- ground water monitoring;
- flood protection;
- storm water controls;
- active landfill gas collection with flare;
- leachate extraction;
- on-site leachate treatment;
- extraction of ground water from the shallow aquifer adjacent to the landfill;
- on-site ground water treatment;
- discharge of treated ground water and leachate to the river.

Estimated present worth cost of this remedial action is \$20.51 million. Estimated cost of operation and maintenance for this remedial action is \$44,000 per year.

Specifics of the remedial action such as the exact number and location of ground water extraction and monitoring wells, leachate extraction wells, and gas extraction wells, as well as the amounts of media to be extracted and treated will be determined in the remedial design. The leachate extraction system will be designed to create a slight influx of ground water into the landfill.



Mr. Valdus V. Adamkus  
Page 2

Language in the ROD also indicates that, should a connection ever be found between PRL and the area of contamination known as the Needmore Road plume, either a ROD amendment or an Explanation of Significant Differences will be prepared as appropriate.

Ohio EPA believes that the selected remedial action for Powell Road Landfill provides the best balance among the alternatives when evaluated against the nine criteria set forth in the National Contingency Plan, 40 CFR, Part 300.430.

Sincerely,



Donald R. Schregardus  
Director

APC

Distribution: Jan Carlson, Acting Chief, DERR  
Jenifer Kwasniewski, Section Manager, T&PSS, DERR  
Catherine Stroup, Legal, Ohio EPA  
Amy Gibbons, SWDO, DERR  
Jeff Hines, SWDO, DERR  
Jan Bartlett, RPM, U.S. EPA  
Joe Dufficy, OH/MN Branch, U.S. EPA